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1853

ANNUAL
REPORT

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OF THE

STATE ENGINEER AND SURVEYOR

ON THE

CANALS

OF THE

State of New-York.

Transmitted to the Legislature February 9, 1854.

ALBANY:

C. VAN BENTHOVEN, PRINTER TO THE LEGISLATURE,
No. 401 Broadway,

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State of New-York.

No. 60.

IN SENATE, FEB. 9, 1854.

REPORT

**Of the State Engineer and Surveyor on the Canals of the
State of New-York, for 1853.**

**STATE ENGINEER AND SURVEYOR'S OFFICE, }
Albany, February 9th, 1854. }**

To the HON. SANFORD E. CHURCH,

President of the Senate :

**SIR—I have the honor to transmit herewith to the Legislature
the Annual Report of the State Engineer and Surveyor on Canals,
for the year 1853, prepared by William J. McAlpine, Esq., my
predecessor in office.**

I am, very respectfully,

Your obedient servant,

JOHN T. CLARK,

State Engineer and Surveyor.



ALBANY, February 9th, 1854.

To the Hon. JOHN T. CLARK,
State Engineer and Surveyor :

SIR—I herewith enclose the Annual Report of the State Engineer and Surveyor for the year 1853, made in pursuance of the requirements of chapter 377, laws of 1850.

Respectfully,

WM. J. McALPINE.

REPORT.

The submission to the people for their final decision of the question of an alteration of the fundamental law of the State, so as to permit of a speedy completion of the unfinished canals, and the duty imposed upon the present Legislature of carrying into effect their decision, if affirmative, have suggested the propriety of presenting the chief subjects relating to the public works in a more extended form than has been customary in the reports from this department.

The citizens of this State, as well as the inhabitants of a large portion of the Union, have so great an interest in our public works, that it is considered necessary to furnish a brief retrospect of their past history, their present condition, and the effect of their completion, under the following general heads.

- I.—The progress of internal improvements in this State.
- II.—The canals and railroads of the State as a dependent system.
- III.—The extension of the channels of trade and travel beyond the State.
- IV.—The cost and charges for transport on these channels.
- V.—The comparative cost, capacity and revenue of the Erie canal and the parallel railroads, and the cost and charges for transportation thereon.
- VI.—An analysis of the present business of the canals.
- VII. A comparison of their present business with that of former years.

VIII. A comparison of the business of the New-York canals with that of other lines.

IX.—The organization of the departments for the construction and maintenance of the canals.

I.—THE PROGRESS OF INTERNAL IMPROVEMENTS IN THIS STATE.

The canals of this State have mostly been constructed at the expense of the State government, and the railroads by private capital, aided in some instances by loans and donations from the government.

These works are more remarkable for their extent than for the natural obstacles overcome, and required in their execution more ability from their financial than from their engineering managers.

The latter have, in most cases, been restrained by the former from expenditures for any purpose not demanded by the most rigid utility, and hence no opportunity has been afforded for those exhibitions of engineering talent which have distinguished the profession in other countries.

The State works, especially, have been constructed with an economy of expenditure that is hardly credited by the engineers of Europe. In some instances this economy has been carried to such an extent as to require the works to be re-built in a more permanent manner. Yet this policy has seldom proved injudicious, as the construction of the first works lessened the cost of those subsequently built, by facilitating the transportation of the materials used, and by developing the resources of the country and demonstrating the value of the improvement.

The State works exhibit the best specimens of the construction of earthen banks for the retention of water, and of well-arranged and durable masonry, which are to be found in the world.

In this respect, the enlarged Erie Canal and the Croton Aqueduct (built by the city of New-York), surpass any similar undertakings in the judicious permanency of their various works.

The works of the Delaware and Hudson canal, built by an incorporated company, and those of the Chenango canal, built by the State, furnish the most favorable specimens of a rigidly economical application of expenditure suited to the circumstances of the respective cases.

The railroads of this State show every variety of construction, from that which involved the largest expenditure to that which was executed with the most rigid economy. The former has been chiefly caused by the progressive improvements which have been made in the construction of this species of internal improvement.

The engineers of this country began the construction of railroads by following the plans laid down by their European brethren; as the latter had unlimited command of capital, so long as their plans were followed in this country the progress of the railroad system was comparatively slow, because capital could not be obtained, and roads thus constructed were not remunerative.

The Albany and Schenectady railroad in this State, and the Baltimore and Ohio in Maryland, were commenced on these expensive plans, copied mainly from those of the Liverpool and Manchester road, in England.

The substitution of a gravel road bed and wooden cross-ties for the expensive foundations of McAdamized stone, timber and cross-ties of the English roads, is due to an engineer of this State. This substitution has caused a radical change in the system of railroad construction, not only in this country but in Europe.

The railroads of this State now furnish the best specimens of large wooden bridges, locomotives, engines and cars, and we hope soon to be able also to record the successful application of wire suspension bridges to railroad purposes, which has been pronounced impracticable by European engineers.

The project of improving the navigation of the Mohawk and extending a water line across the portage to Lake Ontario attracted the attention of the public men of this State at a very early day.

The cost of transportation of furs and the Indian supplies between the interior lakes and the Hudson was alluded to by the

surveyor general, in 1724, and the improvement by means of a canal, of the rapids of the Mohawk, by the Governor in 1768.

Immediately after the revolution, this subject was again brought forward. In 1784 a plan for improving the Mohawk was proposed to the Legislature, and in 1791 they directed surveys and estimates to be made for building canals across the portage from the Mohawk to Lake Ontario and from the Hudson to Lake Champlain. The following year they chartered a company, who built canals and locks at the Little Falls, the German Flats, and at Wood Creek, at a cost of four hundred thousand dollars.

In 1808 the surveyor general was directed to survey a route for a canal from the Hudson to Lake Erie. He employed James Geddes, who reported that canals could be made from Oneida Lake to Lake Ontario, around the Falls of Niagara, and on a direct route from Seneca river to Lake Erie.

Three years later, a commission reported that a continuous canal, on an inclined plane, from Lake Erie to the Hudson was practicable, and would cost five millions of dollars.

The Legislature of that year (1811) directed the construction of the Erie canal, but the war prevented any further action until 1816, when a new commission was formed, who employed Messrs. Broadhead, Wright and Geddes to commence the construction of the Erie, and Mr. Garvin that of the Champlain canal.

The following year the dimensions of these canals were fixed at forty feet surface and four feet depth, with locks ninety feet long and fifteen feet wide. The estimated cost of both canals was stated at seven and three quarter millions of dollars. (The actual cost was about eight and a half millions.)

Work was commenced on the Erie canal by the ceremony of breaking ground, July 4th, 1817.

In 1819, the Canal Commissioners appointed Benjamin Wright principal, and Canvass White and Nathan S. Roberts chief engineers.

To Mr. White is due the arrangement of some of the most important plans and details of the works of the Erie canal, and also

the discovery of the hydraulic cement rocks of Onondaga, which have continued to furnish the supply of that article for the State works.

A portion of the middle section of the Erie canal, and also of the Champlain canal, was opened for navigation in the fall of 1819, and the Erie canal was completed in the fall of 1826.

In 1825, the Legislature directed the construction of the Cayuga and Seneca, and the Oswego canals, and surveys for fifteen other canals, amounting to seven hundred and fifteen miles in length. The Oswego canal was completed in 1828, and the Cayuga and Seneca in 1829.

In 1829, the construction of the Chemung and Crooked Lake canals, was authorised. The former was completed in 1833, and the latter in 1836, under the direction of Holmes Hutchinson, as chief engineer.

The construction of the Chenango canal was commenced in 1833, and completed in 1837, under the charge of John B. Jervis, as chief engineer. The Black River and the Genesee Valley canals, were commenced in 1836. The two last named works are yet unfinished.

— In 1825, the Canal Commissioners stated that "the great press of business on the eastern end, before long, will exclude packet (passenger) boats from this section of the canal." * * * "and it is presumed that the experience of two or three years more will satisfy the public that it would be proper to commence the construction of another parallel canal on the eastern section."

The Legislature of 1834, passed an act directing double locks to be constructed east of Syracuse, and in the following year; directed the enlargement of the Erie canal for its whole extent.

Messrs. Jervis, Hutchinson and Roberts, were appointed chief engineers of this work.

The Canal Board determined the dimensions of the enlarged canal at seventy feet surface, and seven feet depth, with locks one hundred and eighteen feet long, and eighteen feet wide.

The work was commenced in 1836, and prosecuted until 1842, when the embarrassed condition of the treasury and the financial difficulties of the country induced the Legislature to direct a suspension of the work.

A small amount of work has been performed annually since that date, chiefly for the purpose of bringing into use, structures and portions of the canals which had been nearly completed previous to 1842, and those which were necessary to replace the decayed structures and those portions of the canal, the navigation of which was most embarrassed.

The Delaware and Hudson Canal company was incorporated in 1823, and the work was commenced in 1825, and completed in 1830. This canal is one hundred and eight miles long, and as originally constructed had a surface width of forty feet, and a depth of three feet, with locks seventy-six feet long, and eight and a half feet wide. Its dimensions were enlarged in 1848, so as to allow the use of boats of nearly three times the tonnage of those first built.*

In 1827, the Legislature loaned the company five hundred thousand dollars, and in 1829, three hundred thousand, to aid the completion of the work.

Mr. Wright was, at first, the chief engineer, and was succeeded by Mr. Jervis.

The Legislature, in 1825, directed William Campbell, who was afterwards Surveyor General, "to locate and survey a good road from Lake Erie to the Hudson, through the southern tier of counties."

In 1826, the Legislature gave the first charter for a railroad from Albany to Schenectady, seventeen miles long, which was completed in 1830, by John B. Jervis, as chief engineer.

In 1829, DEWITT CLINTON, Jr., published a pamphlet giving a sketch of the route for a railway to connect the navigable waters

* This was effected at a cost of two and a half millions of dollars, and a saving of one half the expense of transportation. (Ass. Doc. 28, 1853, page 124.)

of New-York, Pennsylvania, Ohio, Indiana, Illinois and Michigan, with those of the valley of the Mississippi. This route started from Piermont, on the Hudson river, followed nearly on the line on which the New-York and Erie railroad has since been built to the Allegany river, and thence through Northern Ohio, Indiana and Illinois, to the junction of Rock river and the Mississippi, and thence to Council Bluffs on the Missouri.*

The New-York and Erie railroad company was chartered in 1832, and a survey of the road made by Mr. Clinton, at the expense of the general government. Another survey was made in 1834, by Mr. Wright, at the expense of the State government. In 1836, the Legislature loaned the company three millions of dollars, which sum was subsequently (in 1845), donated to them.

The work on the road was commenced in 1835, but was soon suspended. In 1838 it was resumed; very little was however accomplished until 1845, when new parties took hold of it and opened one half of it in 1849, and completed it to Lake Erie early in 1851.

Horatio Allen was prominently connected with this work as consulting, and T. S. Brown as chief engineer, during its construction.

The first link in the Central line of railroad was completed in 1830, but it was not until 1843 that the whole line between the Hudson and Lake Erie was finished. The continuation of this line from Albany to New-York was commenced in 1847, and completed in 1851.

The line through the northern part of the State was completed in 1850.

The other railroads of the State are generally tributaries of these main trunk lines.

In 1838, the Legislature made loans to the Ithaca and Owego, the Canajoharie and Catskill and the Auburn and Syracuse railroad companies, to the amount of six hundred and thirty-seven thousand seven hundred dollars, and in 1840 to the Auburn and

Connected lines of railroads are now completed, or in rapid progress on the whole length of the route, and nearly on the line described by Mr. Clinton.

Rochester, the Hudson and Berkshire, the Tioga, the Tonawanda, the Schenectady and Troy and the Long Island railroad companies, to the amount of six hundred and forty-eight thousand dollars.

By the last returns made to this office of the several railroad corporations, and from other sources, it is ascertained that there has been expended on all the railroads of this State, the sum of \$117,707,620.58, and that the number of miles in operation is two thousand four hundred and thirty-two.

II.—THE CANALS AND RAILROADS OF THE STATE AS A DEPENDENT SYSTEM.

The canals and railroads of this State are arranged to penetrate the different sections of the interior, so as to form a system of improvements, the support of which renders them mutually dependent.

The freighting business is chiefly performed by the former, while the travel is confined to the latter.

The common highways of the country perform the local traffic of the interior, and carry the surplus to the railroad and minor water lines, which convey it to the districts of aggregated population and the main water lines, by means of which they can be carried to the seaboard, and thence distributed to foreign marts.

The natural water lines of the State are the Atlantic on the southeast, and the western lakes and the St. Lawrence along the northern and western borders. The Hudson river extends the navigation from the ocean along the eastern border to the centre of the State, while Lake Champlain furnishes a navigation for more than one third of its eastern length. The Cayuga, Seneca, and several smaller lakes lying in the interior of the State, are also navigable channels. The upper waters of the Hudson and the Mohawk penetrate the eastern part of the State, the Black river, the Oswego and Genesee rivers penetrate the northern sections, the Delaware and Susquehanna the southern, and the Alleghany the southwestern sections of the State; and each furnish an imperfect navigation during a portion of the year.

These natural water lines formed the first arteries of trade, and were subsequently connected by artificial lines, the completion of which constituted the present system of our canals.

The main trunk of this system is the Erie canal, occupying the valley of the Mohawk and the southern slopes of Lake Ontario, running east and west, nearly through the centre of the State, and connecting the chain of western lakes with the navigable waters of the Hudson.

The Chenango canal, occupying the valley of the river of that name, running from the southern border of the State, northward; connects the waters of the Susquehanna with the Erie canal, near the middle of the State.

The Black River canal (nearly completed) extends from the navigable waters of that river, and connects with the Erie canal near the outlet of the Chenango.

The Oswego canal connects the most easterly harbor in the chain of great lakes, with the Erie canal at the centre of the State, and forms the shortest line between the most easterly of these lakes and tidewater.

The Cayuga and Seneca canal connects the Erie with the lakes of those names, and by means of the Chemung canal, extends the navigation to the Susquehanna.

The Crooked Lake canal completes the navigation between the lake of that name and the Seneca.

The Genesee Valley canal (nearly completed), occupying the valley of that river, running south nearly to the southern borders of the State, connects the Allegany river with the Erie canal, about one hundred miles east of Lake Erie.

The Champlain canal constitutes an independent route, extending the navigation of the Hudson to Lake Champlain, and thence by the improvement of its outlet to the St. Lawrence, in the province of Canada.

All of the above mentioned canals have been constructed by the State.

The Delaware and Hudson canal extending from the Hudson, at the mouth of the Rondout, to the Lackawaxen, a branch of the Delaware, was constructed by an incorporated company, for the purpose of conveying the anthracite coal of Pennsylvania to the New-York market.

The system of railroads consists of three trunk lines running east and west, through the northern, central, and southern sections of the State.

The Northern railroad extends from the upper end of the St. Lawrence to the foot of Lake Champlain, from which continue several lines southerly to the city of New-York, and easterly through the New-England States.

The Central, with the Hudson River railroad, extends from Lake Erie to New-York, running through the central and eastern portions of the State, occupying the southern slope of Lake Ontario and the valleys of the Mohawk and Hudson.

Three branch lines extend from the western division, southeasterly, and connect with the New-York and Erie railroad.

A tributary road is extended from Lake Ontario, south, through the valley of the Oswego river, and connects with the main line, near the centre of the State.

Another tributary extends from the head of the St. Lawrence river, southerly, along the eastern slopes of Lake Ontario to the main line at the sources of the Mohawk.

A third tributary extends up the Hudson River valley to Lake Champlain, by two lines, and thence through Vermont to Upper Canada, connecting with the Northern line at the north end of Lake Champlain.

The New-York and Erie railroad extends from Lake Erie to the city of New-York, through the southern tier of counties, occupying so much of the valleys of the Allegany, Susquehanna, and Delaware as run east and west.

Three tributary roads extend from the Niagara river through the central and western portions of the State, and enter the main line on its western section.

Two of the tributary roads, from the bituminous and anthracite coal fields of Pennsylvania, enter it on the south.

The annexed table (A) furnishes the length of each of these water and railroad lines.

It will be observed that every portion of the State is penetrated by these railroad and navigable water lines, except a section lying at the sources of the Delaware, Susquehanna, and Mohawk, and another section at the sources of several small streams emptying into the St. Lawrence, Hudson, and Mohawk.

The lengths of these lines are as follows :

	Miles.
Of coast navigation on the Atlantic and great lakes, ..	745
Of navigable rivers and minor lakes,	451
Of canals and improved water channels, including those in progress,	997
Of railroads completed,	2,422
Of railroads in progress,	1,000
Making a total length of,	<u>5,625</u>

This gives an average of nearly three miles square for each mile in length of railroad and water lines within the State.

III.—THE EXTENSION OF THE CHANNELS OF TRADE AND TRAVEL BEYOND THE STATE.

Immediately west of the State of New-York lies the great basin of the lakes, and contiguous to it on the south and west, lie the Ohio and Upper Mississippi basins, of equal magnitude. These basins are enclosed from the Atlantic by the Alleghany mountains, except where they fall off to the level plains extending through the centre of New-York.

An inspection of the map, embracing these basins, shows on the one side the chain of great lakes from the further extremity

of Superior, tending *southeasterly* to the lower end of Lake Erie ; and on the other side the Ohio river, from its junction with the Mississippi, tending *northeasterly* to its source in western New-York, and all of the intermediate natural water lines tending towards the same point.

This general direction of the natural water lines of these basins, has given the same course to the artificial water and railroad lines constructed through them, and concentrates in the narrow gorge lying between the northern slope of the Allegany mountains and the eastern end of Lake Erie, a drift of trade and travel which is not to be found elsewhere on this continent.

This concentrated traffic, collected by these fan spreading lines, must be conveyed between the lakes and the Atlantic through the Erie canal and the central and southern lines of railroads of this State to its commercial emporium, from whence it can be distributed by the ocean lines of steamers and sail vessels to every port on the globe.

From the western terminus of the Erie canal and the Central and Southern railroads, extends the chain of western lakes, commencing with Lake Erie, which extends southwesterly between the peninsula of Canada on the north, and the States of New-York, Pennsylvania and Ohio on the south, to Michigan, a distance of two hundred and seventy miles. Thence north through the Detroit river, lake and river St. Clair to Lake Huron, between Canada and Michigan, a distance of forty-five miles. Lake Huron extends in the same direction for a distance of two hundred and seventy miles, and connects with Lake Michigan, which runs south for three hundred and forty miles between the States of Michigan and Wisconsin, to Illinois and Indiana.

From Lake Huron, the river St. Mary, extending northwest for forty-six miles, connects with Lake Superior, which extends westward for four hundred and twenty miles, with Michigan and Wisconsin on the south, Canada on the north, and Minnesota on the west.

There are no rivers emptying into any of these lakes, which are navigable for any considerable distance.

From the southwestern part of New-York, the Alleghany river, running south through Pennsylvania, and uniting with the Monongahela near the western line of that State, forms the Ohio river, which extends thence nearly south between Pennsylvania and Virginia on the one side, and Ohio on the other. The Ohio extends thence nearly west between Kentucky and Ohio, and thence southwest between Indiana and Illinois on the north, and Kentucky on the south, to its confluence with the Mississippi, having an extent of navigation of nearly one thousand miles.

The Alleghany and Monongahela rivers enter the Ohio in Pennsylvania, the Kanawha from Virginia, the Muskingum, Hocking, Sciota and Miami from Ohio; the Licking, Kentucky, Cumberland and Tennessee from Kentucky, and the White and Wabash from Indiana.

The navigation of the Upper Mississippi commences at St. Paul's, in Minnesota, where the St. Croix and St. Peters enter it, and thence runs south to its confluence with the Ohio for one thousand miles, between Wisconsin and Illinois on the east, and Minnesota, Iowa and Missouri on the west.

The Chippewa, Black and Wisconsin rivers enter the Mississippi from Wisconsin, the Rock and Illinois rivers from Illinois, the Iowa and Des Moines from Iowa, and the Missouri river from Missouri.

The annexed table (B) shows the length of the steamboat navigation on the Ohio and Mississippi above their confluence, and of the tributaries before mentioned. Those of the Ohio, with its tributaries, make an aggregate length of more than three thousand miles, and those of the Mississippi of more than four thousand miles.

The lakes and the Ohio and Mississippi rivers are connected by *four* great lines of canals. The *first* extends from Erie, on Lake Erie, south to Beaver, on the Ohio river, a distance of one hundred and thirty-six miles.

The *second* line extends from Cleveland, on Lake Erie, southwest to Portsmouth on the Ohio, a distance of three hundred and

twenty-four miles, with two branches connecting with the first line above mentioned, another branch connecting with the Ohio through the Muskingum river, and another through the Hocking.

The *third* line extends from Toledo, on Lake Erie, to Cincinnati, and also to Evansville on the Ohio. The distance from Toledo to Cincinnati is two hundred and fifty-one miles, and to Evansville is four hundred and sixty-seven miles.

The *fourth* line extends from Chicago, on the southern extremity of Lake Michigan, to the head of navigation on the Illinois river, a distance of one hundred miles.

Another canal is in progress, connecting the northern extremity of Lake Michigan with the Mississippi, through the Fox and Wisconsin rivers.

The New-York Central and the New-York and Erie rail road, through its branches, extend to the falls of Niagara, and there connect with a road across the peninsula of Canada to Detroit, and thence across Michigan to Chicago, and also by a line in progress to Grand Haven on Lake Michigan, opposite Milwaukee in Wisconsin.

From the western termini of the Central and New-York and Erie rail roads, a line of road extends along the south shore of Lake Erie, through Cleveland and Sandusky to Toledo, and thence across Michigan and Indiana to Chicago.

From both Cleveland and Sandusky roads extend to Cincinnati on the Ohio.

From Cleveland a line of roads is in operation through Indianapolis to Terre-Haute, on the western line of Indiana.

From Toledo, Terre-Haute and Cincinnati, lines of roads are in rapid progress to St. Louis, Alton and Quincy, on the Mississippi, and from Quincy and St. Louis other lines are in progress to the Missouri.

From Chicago, roads are completed to Rock Island and Alton,

on the Mississippi, and in progress to Milwaukie and Madison, in Wisconsin, and Galena, Fulton, Quincy, and Cairo, on the Mississippi.

From Fulton and Rock Island, roads are in progress, west of the Mississippi to Iowa city.

From Milwaukie a road is completed to Janesville, and in progress to the Mississippi.

Table B furnishes a list of all the roads in operation in this territory, and includes a number of roads, not embraced in the general lines above mentioned.

The extension of the water and rail road lines beyond the State of New-York, form connected lines of navigation of sixteen hundred miles by Lake, seven thousand miles by Rivers, and sixteen hundred miles by Canals, besides upward of three thousand five hundred miles of connected Railroad lines completed, and as much more in progress.

IV.—THE COST AND CHARGES OF TRANSPORT.

This subject was considered at some length in my last annual report. The views therein presented will be incorporated in the present examination.

An investigation of the comparative advantages of the several channels of communication between the sea board and the interior requires an examination into the cost and charges of transport by the various modes of land and water conveyance.

The *charges* cannot be relied upon, in this investigation, because they fluctuate on the various routes and on the different articles conveyed; competition reducing them to a minimum and monopoly raising them to a maximum.

The *cost* however furnishes a more reliable basis for comparison, as the elements upon which it depends are usually effected alike on the different routes.

These elements consist of loading, conveying, discharging, ware-

housing, insurance, and in artificial channels, the necessary expenses of maintenance and to repay the cost of construction.

The cost of loading and discharging depends upon the price of labor and the facilities afforded, and the cost of insurance upon the character of the navigation.

The cost of conveyance upon the ocean is constant, but the charges are the least from that port at which is concentrated the largest amount of trade, and which possesses a favorable climate and the greatest advantages for reaching the open sea.

New-York possessing these advantages, and those of concentrating at its harbor through the influence of the great internal channels of commerce, the trade of the most extended and fertile district of the interior of the country has thus become the chief commercial centre of this continent.

The chain of western lakes terminating on the borders of this State, furnishes a transport second only to that of the ocean.

The duration of navigation upon them is limited in consequence of the closing of the harbors during the winter season.

The Hudson affords an example of the best description of river navigation in consequence of the uniformity of the flow and the smoothness and depth of its waters, allowing the use of either sail or steam vessels, and of light hulls; thereby increasing the proportion of the weight of the cargo to the whole weight moved.

The Mississippi and its larger branches have the advantage of a long route and a current of from three to six miles an hour in the direction of the greatest tonnage. The fluctuations of their waters and the obstructions of their channels, the higher price of labor, the necessity of employing steam vessels exclusively, and the hazards of the navigation, increase the cost of transportation on these waters.

The cost of movement on a canal depends upon the relative sectional areas of the boat and of the canal—upon the actual size of the two, and upon the elevation to be overcome.

The suspension of navigation upon the northern water lines increases the cost of transportation upon them, as the loss of time and the interest upon the capital invested is charged upon the business done during the limited portion of the year in which they are navigable.

The cost of movement upon a railroad depends upon the amount of the curvature, the inclination of its gradients and the elevation to be overcome, and its limited capacity in comparison with its cost.

The cost of transport on artificial works is increased by the tax necessary to be levied to give a remuneration for the capital invested, and also to pay the current expenses of operating and maintaining the work.

The other circumstances constituting the expense of these modes of transport will be treated of in a subsequent part of this report.

Having thus given the characteristics of the different modes of transport, it becomes necessary to state the actual cost of each, for the purpose of making a practical application to the several channels of trade, between the interior and the sea coast.

In arriving at these general results, it will not be necessary to regard those fluctuations of trade and commerce tending to increase or diminish the cost of transport, which are of only a temporary character.

The following table shows the distances travelled by sailing vessels and the ordinary *charges* from American ports to England, France, the West Indies, and South America, by which it will be seen as has been previously remarked, that the charges from New-York to the principal importing ports of the world are less than from any other American city.

The tables furnish the charges, and the *cost* may be assumed at two-thirds of these charges.

TABLE OF CHARGES.

	To LIVERPOOL.			To HAVRE.			To HAVANA.			To RIO JANEIRO.		
	Miles.	Per ton.		Miles.	Per ton.		Miles.	Per ton.		Miles.	Per ton.	
		Voyage.	Per mile.		Voyage.	Per mile.		Voyage.	Per mile.		Voyage.	Per mile.
From Quebec,.....	2,910	\$11 00	3.75	3,130	.....	.....	1,960	.....	.....	6,010	.....	.....
Boston,.....	3,020	5 25	1.74	3,000	\$5 00	1.67	1,480	\$4 00	2.70	5,310	\$4 00	0.75
New-York,.....	3,150	5 00	1.60	3,318	4 50	1.35	1,250	3 00	2.40	5,240	4 00	0.76
Philadelphia,.....	3,295	5 50	1.70	3,385	5 00	1.47	1,220	4 00	3.27	5,000	5 00	1.00
Baltimore,.....	3,530	5 75	1.60	3,620	6 00	1.65	1,215	5 00	4.11	5,000	6 00	1.20
Richmond,.....	3,395	6 00	1.70	3,485	6 00	1.72	1,170	5 50	4.70	5,000	6 00	1.20
New Orleans,.....	4,755	7 50	1.60	4,845	7 50	1.54	595	4 00	6.72	6,555	7 00	1.06

The rates of freight specified may be considered (they are as far as can be ascertained) a fair average freight of vessel's capacity for the past three years. To Rio Janeiro the freights are low proportionately, as the return freights are generally good.

TABLE OF THE COST OF TRANSPORT PER TON PER MILE.

Ocean, long voyage,.....	1 mills.
“ short “	2 to 4 “
Lakes, long “	2 “
“ short “	3 to 4 “
Rivers, Hudson and of similar character,.....	2.5 “
“ St. Lawrence and Mississippi,.....	3 “
“ tributaries of Mississippi,.....	5 to 10 “
Canals, Erie enlargement,.....	4 “
“ other large but shorter,.....	5 to 6 “
“ ordinary size,.....	5 “
“ “ with great lockage,.....	6 to 8 “
Railroads transporting coal,	6 to 10 “
“ not for coal, favorable lines and grades,	12.5 “
“ “ steep grades, &c.,.....	15 to 25 “

By applying these rates to the transportation of freight between the eastern end of Lake Erie and the Atlantic ports, we arrive at the cost for the several routes, as follows:

1st. By Welland canal, Lake Ontario, and Oswego and Erie canals enlarged, and Hudson river,*.....	\$2 43
2d. Erie canal enlarged and Hudson river, to New-York,.....	2 52
3d. the Canadian canals and the St. Lawrence, to Quebec,.....	2 58
4th. the Welland canal, Lake Ontario, the Oswego and Erie canals, and the Hudson river, to New-York,.....	2 94
5th. the Erie canal and the Hudson, to New-York,....	3 16
6th. Welland canal, Lake Ontario, St. Lawrence, proposed Caughnawaga canal, Champlain lake and canal, and the Hudson, to New-York,.....	3 43
7th. the New-York Central railroad and the Hudson river,.....	6 19

* To the cost of the movement, in each of the above cases, has been added a price per ton, which would, on a movement of two millions of tons per annum, pay the annual cost of maintenance and interest at 7 per cent on the cost of the artificial works through which the several routes pass. In the case of the enlargement of the Erie canal, the movement is taken at four millions of tons, in consequence of its greater capacity.

- 8th. the Welland canal, Lake Ontario, the Ogdens-
burgh and Massachusetts railroads,..... \$8 02
9th. the New-York and Erie railroad to New-York,.. 8 43

It appears, therefore, that after the Erie canal is enlarged, it will be the cheapest channel of trade between Lake Erie and the Atlantic, but there is now a difference in the cost of transportation in favor of the route by the Canadian canals to Quebec.

Applying the foregoing rates to the several routes between different points on the Ohio and Mississippi and the seaboard, gives the following results :

The cost per ton from New-York by the Erie canal, Lake Erie to Cleveland, and the Ohio canals to Beaver, is four dollars and seventy-seven cents.

The same from New-York to Cleveland, and the Ohio canal to Portsmouth, is five dollars and ninety-seven cents ; or by way of Beaver and the Ohio river, is five dollars and eighty-five cents.

The same from New-York to Toledo, and the Ohio canal to Cincinnati, is five dollars and eighty-two cents.

The same from New-York to Toledo and the Indiana canal to Evansville, is six dollars and ninety-nine cents.

The cost from New-York, by the Erie canal and the great lakes, to Chicago, thence to Peru, and the Illinois and Mississippi rivers to St. Louis, is seven dollars and nine cents, and to Cairo is seven dollars and sixty-one cents.

The cost per ton from the capes of the Delaware, through the Delaware and Chesapeake, and the Pennsylvania canals, Portage railroad and Ohio river to Beaver, is four dollars and fifty-nine cents ; to Portsmouth, five dollars and sixty-seven cents ; to Cincinnati, five dollars and ninety-eight cents ; to Evansville, six dollars and ninety-six cents ; to Cairo, seven dollars and fifty-four cents.

The same from the capes of the Delaware by Philadelphia, the Union canal and to Beaver, as before, is four dollars and thirty-one cents ; to Portsmouth, five dollars and thirty-nine cents ; to

Cincinnati, five dollars and seventy cents ; to Evansville, six dollars and sixty-eight cents ; to Cairo, seven dollars and twenty-six cents.

The cost per ton from the capes of Virginia to Baltimore, and thence by the Baltimore and Ohio railroad to Wheeling, is six dollars and ninety-nine cents.

The cost per ton from the capes of Virginia to Richmond, thence by the James river canal and the Kanawha and Ohio rivers to Portsmouth, is four dollars and eleven cents ; Cincinnati, four dollars and forty-two cents ; Evansville, five dollars and forty cents ; Cairo, five dollars and ninety-eight cents.

The cost per ton from St Louis to New Orleans, including the extra cost of drayage and shipment at New Orleans, is six dollars and eighty-nine cents.

From the above statement, it will be seen that the Pennsylvania canals reach the Ohio river at Beaver and Portsmouth forty-six cents per ton cheaper than the New-York and Ohio canals—Cincinnati, Evansville, and Cairo, 12 cents cheaper.

The Virginia canal, if completed, would reach the Ohio river at Portsmouth one dollar and seventy-four cents per ton cheaper than the New-York and Ohio canals ; and Cincinnati, Evansville, and Cairo, one dollar and forty cents cheaper.*

The dividing line of trade between the Pennsylvania and New-York canals, is forty-six miles north of Beaver and Portsmouth and twelve miles north of Cincinnati and Evansville ; but when the enlargement of the Erie canal is completed, the dividing line of trade, in accordance with the same principles, will be extended to the Ohio, and for a distance of thirty miles up that river from Beaver, (say to Pittsburgh,) and will embrace all of the trade below that point, until it is intercepted by that which will descend to New Orleans.

The dividing line of trade between New Orleans and the New-York canals, is now above the mouth of the Illinois river, but

* The Legislature of Virginia, at its last session, decided to abandon the water line across the mountains, and a railroad is now being built, instead of the canal. This increases the cost of transportation by that route, and prevents its consideration as a competitor with the New-York canals.

when the Erie canal is enlarged, with the advantages of the New-York market, and the facility of foreign shipment therefrom, it will be extended to the Mississippi, at least as far down as the mouth of the Ohio.

The completion of the enlargement of the Erie canal, will reduce the expense of transportation about seventy-five cents per ton, which will increase the area of the drainage of its trade as far as that sum will transport by land or water, and will also increase the amount of trade within the present drainage, by permitting the exportation of many articles of large bulk and small value, which are restrained at the present time by the cost of transportation. This extension, as will be seen by the application of the rates given in the preceding table, is equal to *two hundred and fifty miles on a river similar to the Ohio; one hundred and fifty miles on an ordinary canal; fifty miles on a railroad; and five to seven miles on common roads*, where these distances are not met by competing lines, and one-half of those distances where they are so met.

The accompanying map shows the routes of the channels of trade which have been above discussed, and also the districts affording the trade of the several channels.

The last annual report and its accompanying tables furnish full statistics of this trade.

The foregoing tables show the relative *cost* of transport by each route, allowing on each a sum which will pay the interest on the expenditure which has been made to construct the artificial works on them. They do not include the tolls which are charged to reimburse the cost of the works, nor the charges which are necessary to be paid to the forwarders.

If such tolls and charges are made upon the same basis upon each route, the expense of transportation would be in the same ratio as the cost charges given in the preceding tables, while the actual charges would probably be in each case about double the cost charges.

The annexed table marked W, shows the charges on the principal water and railroad lines, according to the last published rates.

V.—THE COMPARATIVE COST, CAPACITY AND REVENUE OF THE ERIE CANAL AND THE PARALLEL RAIL ROADS, AND THE COST AND CHARGES OF TRANSPORTATION THEREON.

The cost of the original Erie canal was \$7,143,789.86, and its estimated cost, when enlarged, including the cost of the original canal, is about thirty-five millions, seven hundred thousand dollars.

The cost of the Erie canal with the equipment necessary to perform its business, corresponding to that of the railroads, is, for the original canal, eleven millions of dollars, and for the enlarged canal, similarly equipped, would be forty-six millions of dollars.

The cost of the New-York Central rail road, including its equipment, was twenty-two millions of dollars, and of the New-York and Erie, thirty-five millions of dollars.

The capacity of the Erie canal, as originally constructed, was equal to one and a half millions of tons carried through, and, when enlarged, it will be equal to seven millions of tons. The tonnage of last year moved upon all the canals, was 4,247,853 tons, but the reports from the collectors of tolls do not show how much of this tonnage was moved on the Erie canal, nor how much of it passed through the whole length.

The tonnage of freight, moved on the New-York Central rail-road the last year, was about 360,000 tons, and on the New-York and Erie was 631,039 tons. The amount of through freight, carried upon these two roads, during the last year, was less than one hundred and fifty thousand tons.

The tolls, at the present rates, due to the capacity of the Erie canal, as originally constructed, would be two and a half millions of dollars, and adding the charges of the forwarders, its revenue would be six millions of dollars, per annum.

The tolls due to the capacity of the enlarged canal, when performing its complement of business and at the present rate of tolls, would be ten millions of dollars, and, by adding the charges of the forwarders, its revenue would be nearly twice that sum.

The capacity of both of these roads with double tracks and fully equipped and in operation the whole year, while doing a passenger business, is equal to that of a canal of the original size of the Erie, or one and a half millions of tons, per annum.

The *cost* of transportation on the Erie canal, including its repairs and maintenance, and the expenses of the forwarders, is *five mills per ton per mile*.

The *cost* of transportation of freight on the Central railroad, including items of expense, corresponding to those above stated, was *nineteen mills per ton per mile*, and on the New-York and Erie was *thirteen mills*.

The *charges* for the transportation of all the freight on the canals in 1853, including the tolls paid to the State, averaged *one cent and one mill per ton, per mile*.

The *charges* for the transportation of all freight on the Central railroad, averaged *three cents and four mills per ton per mile*, and on the New-York and Erie averaged *two cents and four mills*.*

The subject of Internal Improvements of this State cannot be properly examined without considering the canals and railroads as parts of a single system, and not as has been erroneously supposed as two systems antagonistic to each other.

It has been asserted that the revenue of the canals has been stationary or diminishing for several years past, and that this is owing to the competition of the trunk lines of railroads of this State. This alleged diminution of revenue on the canals has been contrasted with the increased receipts upon the railroad lines mentioned, and the opinion expressed that the competition of the

* There were one hundred and thirty thousand tons of lumber, and sixty-five thousand tons of coal carried on the New-York and Erie railroad, in 1853, at a charge of one and a third cents per ton per mile, which reduced the average charge below that of the Central.

latter would reduce the revenue of the canals, or render it stationary by diverting a portion of its business.

For the purpose of showing the incorrectness of these opinions and statements, it is necessary to compare the nature and amount of business done by these roads with that of the canals, and to ascertain the effect of the former upon the latter.

The *first* error is in assuming to make a comparison between the *receipts* of a railroad company and the *tolls* which are collected on the canals by the State, as the former embrace the expenses necessary for keeping the works and machinery in repair, to pay the interest on the capital invested, and to reimburse the principal, and also the *whole expenses and profit charged upon the business done*, while the latter embrace only the charges necessary to keep the works in repair, and the payment of the interest and the principal expended upon their construction, and wholly omit the charges of the forwarders for the movement of the traffic.

The charges thus omitted embrace more than half of the whole cost of transportation upon the canals.

The *second* error is made by including in the comparison the sum collected by the railroads for the conveyance of passengers, while existing circumstances prevent any of this portion of the business from seeking the canals.

This item forms the largest amount of the receipts of the railroads in question.

The *third* error is the assumption that the freighting business done by the railroads has been diverted from the canals, when by an examination of that business it will be seen,

1st. That the charges of railroad transportation being necessarily much higher than those of the canal by taking the receipts instead of the tonnage, the comparison made is fallacious.

2d. That a large portion of this freighting business was the transportation of articles which would not have offered itself to the canals, had there been no parallel railroads.

3d. That many of these articles, being perishable, could not be carried on the canals without serious loss to the owners.

4th. That the largest portion of the freighting business done by the railroads in question, is during that portion of the year when the canals are closed by frost.

5th. That the largest portion of the freighting business is the local business of the roads, which could not reach the canals without, in many cases, increasing the cost of transport beyond the value of the articles.

And finally that the very roads in question and their tributaries, (excepting the Northern,) bring a larger amount of freight to the canal than they convey of its appropriate business to market.

These several positions will be sustained by the following statements :

First. The total sum paid for transportation on the canals in 1853, is ascertained to be about seven millions of dollars, which must be considered as the actual receipts of the canals in making a comparison with those of the railroads. The part of this sum collected for tolls was three million two hundred and four thousand seven hundred and eighteen dollars, or less than one-half the whole receipts.

If this business had been performed on either of the two roads in question, at their present charges it would have cost the people over thirteen millions of dollars for its transportation.

The rates of tolls were materially reduced in 1851, and again in 1852. In the last mentioned year the reduction was from twenty-five to forty per cent on some of the leading articles, making a difference of over three hundred thousand dollars in the receipts.

The tonnage of the canals for the last ten years shows an increase in their business in each successive year, which would not be inferred from a statement of the tolls.

Second—The receipts from passengers on the Northern, Central, and New-York and Erie railroads, in 1853, exceeded four millions

of dollars, and were nearly as large in 1852. ' In 1851, they were about three and a half millions of dollars. These sums exceeded the amount received for the transportation of freight during that period.

Third—It has been previously stated that the charges for the transportation of the freight carried on the New-York and Erie railroad were more than double, and of the Central more than three times those charged for the freight carried on the canal.

The incapacity of the present canal, and the delays and increased expense of navigation upon it, have been the cause of diverting a large amount of business through Lake Ontario and the Oswego canal. This has materially reduced the amount of tolls collected, although the tonnage transported on the eastern end of the Erie canal has not been affected by such diversion.

The number of tons carried on the canals in 1853 was four million, two hundred and forty-seven thousand, eight hundred and fifty-three, carried an average distance of about one hundred and sixty-five miles, while the tonnage of the three railroads referred to was one million two hundred thousand tons, carried an average distance of less than one hundred miles.

Tables of the tonnage and value of all the articles transported on the Erie canal and the Central railroad, from 1848 to 1852, show the distribution of the appropriate business upon a canal and upon a railroad, where they are contiguous and parallel.

The abstract of these tables was given in the last report, as follows:

Of the articles of fur and peltry, live stock, pork in the hog, cheese, butter, wool, hides, peas and beans, dried fruit, cotton, hemp, grass and clover seed, hops, domestic spirits, leather and furniture, domestic woollens and cottons, and oysters and clams, there were transported upon the canals for the four years named, three hundred and eleven thousand five hundred and eighteen tons, and upon the railroads, one hundred and thirty-one thousand eight hundred and seventy-one tons—a proportion of 2.36 to 1, while the proportion for the whole tonnage is as 32 to 1.

The value of the first named quantity was sixty-eight millions, four hundred and ninety-one thousand, seven hundred and seventy-six dollars, and that of the latter, thirty-two millions, seven hundred and eighty-three thousand, one hundred and sixty-one dollars, showing a value of that carried on the *canals of two hundred and nineteen dollars and eighty-six cents per ton, and that upon the railroads of two hundred and forty-eight dollars and sixty cents per ton.*

Of the articles, boards and scantling, shingles, timber, staves, wood, lard, lard oil, tallow, flour, wheat, rye, corn, corn meal, barley, oats, other grain, bran and ship stuffs, potatoes, beer, linseed oil, oil cake, starch, agricultural implements, iron, machines and salt, there were transported upon the canals for the four years named, nine millions, one hundred and seventy-two thousand, nine hundred and ninety-five tons, and upon the railroads, eighty-four thousand six hundred and fourteen tons—a proportion of 108.4 to 1, while the proportion for the whole tonnage is as 32 to 1.

The value of the first named quantity was one hundred and sixty-five millions, seven hundred and twenty thousand, six hundred and ninety-three, and that of the latter, two millions, nine hundred and eighty-three thousand, eight hundred and thirty-seven, showing a value per ton of that carried upon the *canals of eighteen dollars and six cents, and that carried upon the railroads of thirty-five dollars and twenty-six cents.*

Of all the other articles named in the table, there were transported by the canals, two millions, three hundred and fifty-seven thousand, nine hundred and two tons, and upon the railroads, one hundred and forty-three thousand four hundred and forty-four tons; having values of two hundred and fifteen millions, three hundred and thirty thousand, six hundred and thirty-eight dollars, and twenty-eight millions, two hundred and three thousand, one hundred and nine dollars, *or ninety-one dollars and thirty-two cents, and one hundred and ninety-six dollars and sixty-one cents per ton, respectively.*

By careful inspection of the table referred to, it appears that the following causes transferred the carriage of freight to railroads

running parallel to and adjoining the State canals, even during the time the former was subject to the payment of the same tolls as were charged upon the canals.

First.—The entire suspension of navigation for a period averaging about five months in each year.

Second.—The fluctuating price and demand in market for such articles as butter, cheese, live cattle, sheep and hogs, which also require the most speedy means of transit to prevent the loss of weight, quality and value, while undergoing transportation.

Third.—The transportation of articles of such value and great bulk as fur and peltry, wool, hops, furniture and domestic woollens and cottons, for which the railroad is better adapted than the canal, by reason of the much greater proportion of room to tonnage in the freight car than in a canal boat,* and the less time occupied by railroad trains in bringing these commodities (which are easily handled) to market; an object, in itself, sufficient to induce the consumer or manufacturer to pay the extra cost of railroad transportation.

Fourth.—Western merchants who obtain the whole of their stock in New-York, can afford to pay the extra cost of railroad transportation on light merchandize, and thereby compete with those who purchase in nearer but more expensive markets. The cheaper mode of transport, canal navigation, at the same time affords the means of delivering heavy goods at a less expense than by the southern routes, but occupies a longer time.

In addition to these causes, it may be added that the most convincing proof of the performance of the respective duties of the two channels of trade and travel, as above stated, is shown by the average value of the articles transported upon each: that upon canals being, for the four years before named, \$48.68 per ton, and upon the railroads \$227.41.

Thus the conclusions are arrived at, that those products and

* The average capacity of a freight car designed for carrying eight tons, is 259.75 cubic feet per ton, and of the present largest class canal boats, intended to carry 90 tons, is 59. cubic feet per ton, and for boats on the enlarged canal, is 32.4 cubic feet per ton.

articles which are now profitably transported over the railroads, could not, in most instances, be moved upon the canal without serious loss to the owner or producer, and that the diversion of this business from our navigable channels has served to augment the legitimate business of the Erie canal.

An inspection of table R, in the appendix of last year's report, shows the number of tons of all articles delivered at tide-water by the canals and railroads during the years 1848 to 1851 inclusive, and fully sustains the views expressed in the foregoing pages.

The following is a classified statement of the freighting business done on the New-York Central and the New-York and Erie railroads, for the months of August and September, 1853. The reports of the several companies consolidated under the name of the New-York Central, do not furnish the means of extending the comparison for the whole year.

	New-York & Erie. Tons.	N. York Central. Tons.
The product of the forest,	25,559	2,438
do animals,	19,632	25,723
Vegetable food,	14,001	18,587
Other agricultural products,	1,701	3,464
Manufactures,	14,746	6,235
Merchandize,	12,656	12,846
Other articles, miscellaneous,	*36,059	3,847
Total tons,	124,354	73,140
Equivalent to tons moved one mile,	19,202,049	10,861,290
Average movement of each ton, ...	154 miles.	148 miles.
Whole length of road,	446 do	300 do

The above table exhibits the cause of the reduced average rate of charges for transportation on the New-York and Erie below that of the Central, in the fact of the former road carrying so large a proportion of the products of the forest and mines, necessarily at a low rate, and thus reducing the average.

* Chiefly coal.

Thus it appears that all of the heavy articles, and those not requiring a speedy transit, were carried on the canal when a choice between the two was afforded; that these articles were carried to the canals by the railroads when it was accessible, and that they were only carried on the railroads from districts inaccessible to the canals, and then frequently at rates so near the cost of transport as to afford but little or no profit to the railroad company.

The tables accompanying the last annual report furnish the means of ascertaining the proportions of local freight and its character, carried by the three trunk lines of railroads in this State in 1852. As far as can be ascertained from the reports of these roads for the last year, the same proportions are yet maintained.*

Tonnage carried in 1852.

	Whole.	Local.	Through.
Northern railroad,	181,806	67,646	114,160
New-York Central railroad,...	311,000	279,713	31,287
New-York and Erie railroad,...	456,462	409,615	46,847
Total of the Central and Erie,	767,462	689,328	78,134

The local freight which was carried on the Central and Erie railroads in 1852, was ninety per cent. of the whole tonnage.

The local freight on the Northern road was but thirty-seven per cent. of the whole tonnage.

The character of the local and through freight on the Northern road is essentially different from that on the Central and on the Erie.

* Since the above paragraph was written, I have been furnished with the amount of through tonnage carried in 1853 on the New-York Central and Erie railroads, which shows a larger proportion of through tonnage than in 1852.

New-York Central, whole tonnage, estimated,	360,000
New-York and Erie, do	631,039
	<u>991,039</u>
	Through, east. Through west. Total.
New-York Central, tons	46,413 28,637 75,050
New-York and Erie, do	46,624 28,381 75,005
	<u>150,035</u>

The local tonnage in 1853, is thus ascertained to be 85 per cent of the whole.

The products of the forest were wholly local; the product of animals was one-third local; agricultural products and merchandize were nearly all through. Manufactures and other articles were about equally divided between local and through.

This road connects with the net work of the New England roads at Lake Champlain, and as there is a large deficiency of agricultural products in the interior of that district for home consumption, it receives its imports of such articles chiefly through the Northern railroad, which accounts for the large through transportation of those articles over that road.

On the New-York and Erie railroad, the products of the forest, and manufactures, and miscellaneous articles, were almost wholly local. The products of agriculture and of animals were four-fifths local, and merchandize was nearly three-fourths local.

VI.—ANALYSIS OF THE PRESENT BUSINESS OF THE CANALS.

The annexed tables D, furnish a comparative statement of the tonnage and toll of all and each of the canals, of that arriving at, and that leaving tide-water, of the tonnage shipped from the western termini, of that from this and the western States, the tonnage and tolls of the several classes, and of some of the principal articles of each class transported.

This table has been made by taking the tonnage and tolls of all the canals as a standard, and stating the proportions which each of the canals, shipments, classes, and articles named, bear to the amount of all the canals. A glance at the tables as thus arranged is sufficient to furnish the reader with a tolerably correct idea of the relative business done upon each canal at the chief localities, and in the transportation of each of the classes and articles carried.

The following deductions from these tables will serve to present some of the more striking points in the business performed :

First. That while the tonnage upon the Erie canal is but little more than one-half of the total tonnage of the canals, the receipts for tolls are three-fourths of the whole receipts.

Second. That while the tonnage of the Oswego and Champlain canals forms nearly one-third of the whole tonnage the receipts for tolls on both are sixteen per cent of the whole, and while that of the Chemung, Genesee valley and Cayuga canals, forms one-ninth of the whole tonnage, the receipts for tolls on them are eight per cent of the whole.

Third. That the tonnage arriving at tide-water is nearly three-fifths of the whole; that leaving tide-water is about one-seventh; and that shipped elsewhere is nearly three-tenths of the whole tonnage.

Fourth. That the tonnage shipped at Lake Erie is nearly one-fifth; at Oswego nearly one-eighth, and at Whitehall one-twelfth of the whole tonnage.

Fifth. That the tonnage from the western States forms nearly one-third, and that from this State about two thirds of the whole tonnage carried.

In the classification of the articles transported, the following deductions are made from the table:

First. That the tonnage of the products of the forest is forty-three per cent; of vegetable food twenty-five per cent; of merchandise eleven per cent, and other articles fourteen per cent; while the receipts for tolls from the first are but eighteen per cent; from the second forty per cent; from the third twenty-two per cent, and from the fourth but four per cent of the whole.

The tonnage of manufactures being five per cent, and the tolls four per cent, and the tonnage and tolls of the products of animals being each but about two per cent of the whole.

Second. That the tonnage of lumber is about one-fourth of the whole, and the receipts for tolls one-eighth; that the tonnage of flour, wheat and corn, is nearly one-fourth, while the tolls are over one-third.

Third. That timber, salt and railroad iron, form each four per cent of the tonnage, while the tolls of the first are three per cent, and of the two latter are each one per cent of the whole.

The foregoing statements and deductions have been made from the report of tolls, trade and tonnage, as prepared by the Auditor.

The tonnage and tolls due to the movement on each of the canals, cannot be ascertained from these reports, as they only show the tonnage cleared at each collector's office, and the whole tolls collected thereon, whether the articles are conveyed on one or more of the canals.

Thus the tonnage of lumber shipped at Buffalo, in 1852, was eighty-one thousand one hundred and two tons, and the tolls collected thereon, were fifty-nine thousand three hundred and forty-four dollars. If this was all white pine carried on boats, the amount of the tolls shows that it had a movement equal to that of twenty millions of tons, moved one mile, or nearly equal to an average movement of fifty-six thousand tons from Buffalo to tidewater.

The tonnage of lumber shipped at Oswego, is one hundred and forty-seven thousand and eighty-six tons, and the tolls collected thereon were sixty-four thousand eight hundred dollars, which shows a movement equivalent to that of twenty-one millions of tons, moved one mile, which for the length of that canal (thirty-eight miles,) would be equal to an average movement of nearly five hundred and seventy thousand tons from Oswego to Syracuse, (which is absurd), or of one hundred and six thousand tons to tide-water. Three-fourths of the movement of this tonnage and of the tolls, is, therefore, evidently due to the Erie canal, and one fourth only to the Oswego.

The tonnage and tolls on up freight, on the other hand, are credited in these reports to the Erie canal, when a portion of the movement and of the tolls is due to the lateral canals.

This method of stating the tonnage of the several canals is incorrect, and operates so as to show a less amount done on the Erie canal than is due to it, because the up tonnage is but one fourth of the down tonnage.

The annexed table E., has been prepared from the reports of the business done in 1853, and shows the tonnage, tolls, and total movement of each article and class of freight on all of the canals.

The report of the Auditor, as before stated, does not furnish the means of showing a similar statement for each of the canals.

The whole movement in 1853, was equal to seven hundred millions of tons moved one mile, or an average movement of nearly one hundred and sixty-five miles for each ton. The average movement of the tonnage on the Erie canal, excluding that of the lateral canals, is, probably, nearly three hundred miles for each ton.

The average rate of toll in 1853, was 4 6-10ths mills per ton per mile, for the whole tonnage 2 2-5ths mills, for the products of the forest, 4 1-10ths for animals, 5½ for vegetable food, 5 2-10ths for manufactures, except salt, 6 2-10 for merchandise, and 2 6-10 mills per ton per mile for all unenumerated articles.

The comparative movement of each class, compared with the whole movement, was as follows:

Products of the forest thirty-four per cent; agricultural products, thirty-seven per cent; merchandise, sixteen and a half per cent; manufacturers, four and a half per cent; miscellaneous articles, eight per cent.

The comparative movement of some of the principal articles embraced in these classes is as follows:

First. Of the forest. Boards and scantling, twenty-four per cent of the whole movement of all articles on all the canals; staves, four per cent; timber, five per cent.

Second. Of the products of animals. Pork, one per cent; beef and bacon, 6-10ths; lard, 3-10ths; wool, 2-10ths; butter, cheese and hides, each 1-10th of one per cent of the whole movement.

Third. Of vegetable food. Flour 13½ per cent, and wheat 10½ per cent; corn, 4 7-10ths per cent; oats, 8-10ths of one per cent, and barley, two per cent.

Fourth. Of manufactures. Salt, two per cent; pig iron, 9-10ths of one per cent; and domestic spirits 7-10ths of one per cent;

castings, 6-10ths; bloom iron, furniture and leather, each 1-10th of one per cent of the whole.

Fifth. Merchandise, 10½ per cent; and railroad iron six per cent of the whole.

Sixth. Unclassified articles. Coal, 3 7-10ths per cent; stone, lime and clay, 2 per cent; and live cattle, sheep and hogs, 5-1000ths of one per cent of the whole.

By reference to the tonnage tables, it will be seen how widely the proportions given by them differ from those presented by the total movements of these classes.

VII.—A COMPARISON OF THE PRESENT BUSINESS OF THE CANALS WITH THAT OF FORMER YEARS.

The annual reports of the tolls, trade, and tonnage of the canals furnish much information on this subject, though it is to be regretted that they have not been prepared so as to show the movements of trade on each of the canals separately, and also, of each class of articles on each canal.

These reports are very voluminous, and are distributed through many volumes, and the figures are very large, so that it is troublesome to compare the details of the business of one year with that of several others.

For the convenience of those who desire to follow out these examinations for a series of years, the annexed table (F) has been arranged, which does not repeat the quantities furnished in the reports, but in place thereof shows the comparative business from 1843 to 1853, inclusive, that of 1848 being used as the standard for the comparison. It exhibits the entire business of all the canals, and that of each separately; that arriving at, and that leaving tide-water; that shipped at the lakes, and also each article and class of articles.

The rates of tolls were not changed from 1847 to 1849. In 1850, the toll on pork and its products, corn, barley, iron, salt, and merchandise was reduced. In 1851 the toll on beef, cheese,

hides, flour, wheat, and railroad iron was reduced. In 1852 the toll on lumber, pork, bacon, lard, tallow, cheese, butter, cotton, iron merchandise, and railroad iron was reduced.

The famine in Europe created so great a demand for breadstuffs that the trade of 1847 was increased beyond that of the following year. For this reason the comparison has been made between the years 1843 to 1847, and the years 1848 to 1853.

An examination of the table shows :

First. That the tonnage and the tolls of all the canals, and also of the Erie, and with two slight exceptions of the Champlain, increased year by year from 1843 to 1847 ; and that while the tonnage increased year by year from 1848 to 1853, the tolls remained about stationary.

Second. That the tonnage and the tolls of the Oswego canal increased rapidly to 1847, and also to 1850 ; and then, while the tonnage continued to increase rapidly, the tolls fell off.

Third. That the tonnage arriving at tide-water increased year by year to 1847, and from 1848 to 1853, and that the tonnage leaving tide-water increased to 1848, fell off in 1849, and has rapidly increased since.

Fourth. That the tonnage shipped at Lake Erie has increased to 1847 (the increase was eighty per cent. in 1847, while a falling off of twenty-five per cent. took place in 1848), and has increased year by year from 1848 to 1853.

Fifth. That the tonnage shipped at Oswego has increased nearly five times up to 1848, and has regularly increased every year since, being six times more in 1853 than in 1843.

Sixth. That the tonnage shipped at Whitehall has increased to 1846, that it fell off one half in 1847, increased in 1848, and has continued to increase since, except in 1851, when it fell off largely.

A comparison of the tonnage and tolls of the different classes of articles transported shows :

First. That of the products of the forest, the tonnage has increased year by year to 1847, while the tolls increased to 1845,

fell off in 1846, increased in 1847. The tonnage remained stationary in 1847, '48, and '49, and has since uniformly increased, while the tolls increased from 1847 to 1850, and have fallen off every year since.

Second. That of the products of animals, the tonnage and tolls have increased to 1849, and have since diminished year by year.

Third. That of vegetable food, the tonnage and tolls on all of the canals have increased year by year to 1847, and that the tonnage has increased irregularly from 1848, while the tolls decreased to 1851, and have since increased; and that while the tonnage of wheat and flour from this State, and the tolls derived therefrom, have decreased since 1848, from other States they have steadily and largely increased.

Fourth. That of manufactures, the tonnage and tolls have increased from 1843 to 1853, some of the years showing a slight falling off.

Fifth. That of merchandize, the tonnage has increased year by year since 1843, while the tolls increased to 1848, remained stationary to 1850, increased in 1851, and fell off in 1852.

The following is a comparison of the tonnage and tolls of some of the principal articles embraced in the foregoing classes:

Lumber.—The tonnage and tolls increased to 1847, fell off slightly in 1848, and have increased rapidly to 1853, except in 1852, when a falling off in tolls took place.

Beef, Pork, Bacon and Lard.—The tonnage and tolls have been irregular.

Butter and Cheese.—The tonnage and tolls have increased to 1848, since which they have rapidly decreased.

Flour.—The tonnage and tolls have increased to nearly double in 1847, and remained nearly stationary to 1850. The tonnage increased to 1852, and fell off in 1853, while the tolls decreased rapidly in 1851, and also in 1853.

Wheat.—The tonnage and tolls increased to nearly three times in 1847; fell off in 1848-9; increased in 1850; fell off in 1851, and increased rapidly in 1852-3.

Corn.—The tonnage and tolls of this article exhibit the most astonishing fluctuations, the tonnage and tolls being six times as much in 1846, twenty times in 1847, and thirty times as much in 1851 as in 1843. They decreased in 1848, increased in 1849, decreased in 1850, increased largely in 1851, and decreased very much in 1852-3.

Oats and Barley.—The tonnage and tolls have generally increased year by year to 1853.

Domestic Spirits, Pig Iron and Castings.—The tonnage and tolls have generally increased year by year.

The stationary condition of the tolls on the Erie canal since 1848 is mainly owing to the diversion of a portion of the diversion of a portion of the western trade by the way of Oswego, and also to the reduction of the rates in 1850, '51 and '52.

The tonnage from other States cleared at Oswego in the last six years has been nearly eighteen hundred thousand tons, more than half of which was vegetable food.

The tonnage from other States shipped in 1852 at Oswego, and that sent to them by the way of Oswego during the last year, amounted to five hundred thousand tons, the tolls on which are estimated to have been over half a million dollars.

A large amount of the trade by the way of Oswego belongs to Canada, and the imperfect navigation of the Erie canal, west of Jordan, has undoubtedly cause the diversion of a considerable amount of trade to the Oswego route.

The reduction in the tonnage of the products of animals has been, to some extent, owing to the transfer of these articles to the Central and New-York & Erie railroads.

The following table shows the quantities carried by each from 1849 to 1853:

	By Canal.	By the Railroads.		
		Central.	N. Y. & Erie.	Total.
Products of animals, 1849,	91,854	13,859	Not	
" 1850,	79,919	29,572	opened.	
" 1851,	68,799	33,847	53,991	87,838
" 1852,	63,992	50,000 est'd	75,943	125,943
" 1853,	70,612	80,000 est'd	99,755	179,755

The annexed table (T.) shows the articles classified as the "products of animals," carried by the Erie canal, and the New-York Central and the New-York & Erie railroads, from 1849 to 1851 inclusive.

The reports of the railroad companies after 1851, do not furnish the amount of the articles forming this classification. In the reports of the Central railroad for 1849 and 1850, and of the Central & Erie for 1851, these are stated, from which it appears that on both the Central and Erie railroads, in 1851, more than one-third of the amount of this class was made up of live cattle, which the canals did not carry; another third on the Erie, and a considerable amount on the Central, were fresh meat, game and milk, which the canals could not carry, and that the amounts of beef, pork, bacon and lard, which together formed nearly one-half of the articles of this class carried by the canal, formed but one-thirtieth of this class on the railroads, and that butter, cheese and wool were the only articles of this class carried by the railroads which were to any extent diverted from the canal.

VIII.—COMPARISON OF THE BUSINESS OF THE NEW-YORK CANALS WITH THAT OF OTHER LINES.

The statistics of the trade passing through the channels which connect the interior with the Atlantic, are not furnished in the reports of other lines in a convenient manner to permit of a comparison with those of this State. It has been necessary therefore to obtain some of the results stated in the annexed tables H. from other sources, and in some cases to arrive at the division of the trade on the several lines by estimate.

From these tables it appears,

1st. That the whole tonnage transported upon the St. Lawrence canals is fifteen per cent, and that transported upon the Pennsylvania canals is twenty-three per cent of that transported upon the New York canals.

2d. That the tonnage arriving at tide-water by the St. Lawrence canals is fifteen per cent, and that by the Pennsylvania canals is twenty-five per cent of that arriving by the New-York canals.

3d. That the tonnage from the western States passing through the St. Lawrence canals and that passing through the Pennsylvania canals, are each seven per cent of that passing through the New-York canals.

4th. That the tonnage from the Atlantic destined for the western States by the way of the St. Lawrence canals is thirteen per cent, and by the way of the Pennsylvania canals is twenty per cent of that by the way of the New-York canals.

5th. That the whole tonnage of the New-York Northern railroad is six per cent; of the New-York Central is nine per cent; of the New-York and Erie is fourteen per cent; of the Pennsylvania railroad is two per cent; and of the Baltimore and Ohio is seven per cent of the tonnage of the Erie canal.

6th. That the tonnage shipped from the western terminus eastward by the Northern railroad is eight per cent; by the New-York Central is three per cent; by the New-York and Erie is four per cent; by the Pennsylvania is two per cent; and by the Baltimore and Ohio is three per cent of that shipped by the Erie canal.

7th. That the tonnage shipped from the eastern terminus westward by the Northern railroad is five per cent; by the New-York Central is eleven per cent; by the New-York and Erie is twenty-two per cent; by the Pennsylvania is five per cent; and by the Baltimore and Ohio is ten per cent of that shipped by the Erie canal.

8th. That the through tonnage carried by the Northern railroad is eight per cent; by the New-York Central is two per cent; by the New-York and Erie is three per cent; by the Pennsylvania and also by the Baltimore and Ohio is two per cent of that carried by the Erie canal.

It thus appears that the business of the New-York canals exceeds the combined business of all of the Canadian and Pennsylvania canals, and the New-York and Pennsylvania and the Baltimore and Ohio railroads by forty per cent, and that the western business done by the New-York canals is *three times as great as the aggregate business of all of the other lines*; and also that the chief part of the business done by these lines is local traffic of the country through which they pass. The cost of transport by these routes as stated in the last report, limits the extent of their competition for the trade of the west, and hence the rivalry for this trade is between the water lines leading to New-York and those leading to New-Orleans.

The following statement of some of the principal articles received from the interior at New-York and New-Orleans, will show the comparative amount of the trade conveyed to tide water by these lines:

	For the years 1848, 1849 and 1850.		For the year 1852. In tons.	
	New-Orleans.	New-York.	New-Orleans.	New-York.
Bacon pounds	135,622,515	26,364,156	35,000	4,861
Butter "	6,215,970	61,695,064	1,000	3,668
Beef bbls. . .	200,901	264,072	9,300	12,430
Corn bush. . .	9,758,750	11,178,228	90,000	151,012
Cheese pounds	8,955,880	97,596,632	1,500	8,000
Flour bbls. . .	2,312,111	8,636,207	92,700	363,160
Lard pounds	292,110,060	27,137,175	19,600	5,287
Pork bbls. . .	1,536,817	211,018	46,500	11,068
Wheat bush. . .	852,497	8,798,759	3,300	177,408
Other grains " . .	5,350,151	11,212,239	12,000	166,400

This table does not include lumber, sugar and tobacco, the former of which furnishes the heaviest amount of tonnage transported on the New-York canals, while the two last named articles

form the heaviest items of the tonnage delivered at New-Orleans, because these articles are peculiar to their respective routes.

Of these exports from the west, the product of the hog finds its chief market at New-Orleans, as it is not slaughtered early enough in the fall to be carried through our canals, while wheat, flour, butter and cheese, which can reach the northern water lines before they are closed by frost, are chiefly conveyed through them. Whenever the cost of transport by the northern route is cheapened to an extent equal to the interest on the cost of these articles for the period necessary to hold them until the northern lines are opened, they will seek that channel. The railroad lines penetrating the district the trade of which is now disputed, will generally increase the trade through the northern lines.

The following statement shows the trade of the lakes and of the valleys of the Mississippi and Ohio.

	FOR THE YEAR 1846.		FOR THE YEAR 1850.	
	Lakes.	Mississippi Valley.	Lakes.	Mississippi Valley.
Value of the commerce,.....	\$63,164,910	\$183,609,725	\$105,255,347	\$275,000,000
Tonnage employed, steam, tons	106,836	*249,055	185,017	135,559
flat boats,..... do	.....	300,000	.....	.....
Tons transported,.....	3,861,088	.....	6,536,841	.....
Value of shipping,	\$6,000,000	\$12,942,355	\$10,200,000	.....
Number passengers carried,	250,000	.....	1,514,290	4,347,560
Receipts from passengers,	\$1,250,000	\$3,191,982	\$2,335,000	.....
Population dependent for communication to market,	2,928,925	6,576,027	.....	.....
Number of mariners employed,	6,972	*25,114	10,500	14,752

* These amounts are evidently incorrect.

The preceding table shows that the commerce of the valleys of the Mississippi and its tributaries, is about twice as much as that of the lakes; but it is proper to remark that a portion of this commerce, on some of these tributaries of the Mississippi, already contribute to the lake business.

When the enlargement of the Erie canal is completed, the cost of transport will be so much reduced that the products of the west can be brought to the New-York market from as far as the confluence of the Ohio and Mississippi rivers, cheaper than to New-Orleans. Whenever this is done, it will add to the business of the New-York canals the trade of one-fourth of the States of Ohio, Indiana and Kentucky, of one-half of the States of Illinois and Wisconsin, and of the whole of the western Mississippi valley above the mouth of the Ohio.

This territory, according to the census of 1850, contains an area of.....	287,014 square miles.
A population of.....	2,050,000
Land in farms, improved,	14,050,000 acres.
do unimproved,	19,000,000 do
Cash value of farms,.....	\$301,500,000
do live stock, on do.....	59,700,000
The annual production of wheat was.	20,000,000 bushels.
do Indian corn was,	120,000,000 do
do wool was	6,000,000 pounds.
do butter was	25,000,000 do
do cheese was.....	4,000,000 do
The annual value of animals slaughtered was	\$15,000,000

The State of Ohio has a lake coast along her northern border, and a river coast along the southern; she is crossed by three lines of canal and three of railroads from the Ohio to the lakes.

The quantity of wheat raised in this State the last year, was over thirty millions of bushels, and of corn over sixty millions.

The home consumption does not amount to one third of these quantities.

The area of that portion of the States included in the above table, (excluding the territories) is four times that of the State of Ohio, and embraces land which is capable of a greater production, in view of the facilities of the water lines of the Ohio, Wabash, Mississippi, Illinois, Wisconsin, Des Moines, Missouri and other navigable streams, which penetrate it in all directions, and the railroad lines completed and in progress, and the rapidity of the emigration to and settlement of the country, it is not unreasonable to suppose, that, within a limited period, the population and products of this region will be equal to four times those of the State of Ohio, in 1853.

This would give a population of eight millions, an annual production of over three hundred millions of bushels of wheat and corn, and a surplus of all kinds for export, equivalent to at least five millions of tons per annum.

The tonnage of the Erie canal from the western States, arriving at tide water, has been as follows:

In 1840,.....	158,148 tons.		
1845,.....	304,551	"	Increase 146,403.
1850,.....	841,501	"	" 536,950.
1852,.....	1,151,978	"	" 310,477.
1853,.....	1,213,690	"	" 61,712.

The increasing ratio of the business from the western States, will fully occupy the augmented capacity, which can be annually given to the Erie canal by its enlargement and improvement, until it is completed.

The region just described, together with the increase of the products of the country already drained by the canal, will furnish a business more than equal to its increasing capacity.

In the preceding remarks an effort has been made to present the subject of the internal improvements of this State as a connected system, and while discussing the comparative advantages and distinct duties of each kind of improvement, to show also their mutually dependent relations, and influence upon each other.

The change in the pursuits of the population of this State, as well as the concentration at its commercial capital of so large a portion of the trade, wealth and population of the nation, has made it necessary to enter into an examination of the extension of the system of internal improvements through the great basins of the lakes, of the Ohio, and of the Mississippi, from whence so large a portion of the trade and travel, which is to furnish the future support of our trunk lines, must come.

The chief points which have been examined, may be briefly stated as follows:

The natural features of the country, suggested at a very early day, the lines upon which the main works were to be constructed, and the people of this State availing themselves of those natural advantages, commenced and completed a system of internal improvements which was carried on, partly by the government and partly by private enterprise, in advance of any similar understanding in the Union, to a greater extent than any State of equal domain, and with a success that has excited the emulation not only of her sister States but also of the governments of Europe.

This system of public and corporate enterprise has been completed with an economy and a judiciousness of expenditure which has been rarely excelled.

The natural water lines surrounding and penetrating the State, indicated the artificial lines for connecting and extending them to the interior, while the commercial activity and enterprise of our people, and the rapid development of a vast inland and fertile territory brought into existence an adjunct system, by means of which the secluded districts which could not be reached by artificial water lines, were connected with the most accessible of those lines by a species of conveyance second only to canals for cheapness and transport.

The superiority of railroads for the rapid conveyance of passengers, and those descriptions of freight too perishable or too valuable to be forwarded by the slower but cheaper movements of water lines, soon led to their establishment over every section of the State, and to the paralleling of almost every water line.

The benefits which the completion of the Erie canal conferred on the citizens of this State, led to the extension of the system across the portages between the western lakes and rivers.

The sparseness of the population, the ready accessibility to the natural water lines, and the home demand for the product of the west caused by the influx of the multitudes of new settlers, prevented these canals at first from proving as remunerative as their projectors anticipated; but the time is not distant when they will realize all these anticipations.

The difficulty of constructing even passable turnpikes through the rich soil of the west, the facility and cheapness of building railroads, and their exact adaptation to the impulsive, energetic and social character of the people, united to make this species of conveyance a favorite one in that region, and railroads have there been built so fast that the "guide book" is almost valueless if it be three months old.

With the public mind thus turned so strongly in favor of railroads, it is almost hazardous to enter into an advocacy of the superior advantages of the water lines for the conveyance of the internal commerce of the country. The slow, plodding canal boat, with its cargo nearly equal to that of a locomotive and its long, dashing train, is almost forgotten, until we are reminded by the daily arrival of these boats at this city that it would require the daily arrival of one hundred locomotives and fifteen miles of cars to perform that business done on the Erie canal, which hardly attracts the attention of either the passing traveller or of our own citizens.

The comparative cost of transport by land and water was discussed in the report of last year at considerable length, and the subject is further examined in the present report.

The experience and information obtained during the past year in relation to the cost by the various channels, have confirmed the statements formerly presented.

The application of these general results showed that New-York with her canal enlarged was the cheapest channel from the Ohio

and Mississippi vallies to the Atlantic; and the further examination of the present trade with the West showed that she had no formidable competitor for their trade until the cheapness of transport down the Ohio and Mississippi intercepted it in those great basins.

The effect of the enlargement of the Erie canal would be to place within her grasp the traffic of an extent of territory which would soon afford one-half as much tonnage as that already passing through her canals.

As the public mind had become somewhat disturbed by the assertions that the railroads of this State were diverting a large portion of the business of the canals, and would probably prevent an increase in the revenue sufficient to pay for the completion of the unfinished works without resort to taxation, it was considered proper to carry out a comparison between the cost, capacity and revenue of the canals, and of those roads, and the cost and charges for transportation thereon, which resulted in showing that the aggregate cost of the Central and Erie roads was much greater than that of the Erie canal when its enlargement is completed, while their capacity was less than one-fourth as great; and also, that the cost of transportation on these roads was three times that of the canal, and the charges more than double.

The errors of the statements which were offered to prove that the railroads diverted the business from the canals were exhibited, by showing that the receipts of the canal compared with those of railroads, were understated one-half, while the railroad receipts were overstated one hundred per cent. It was shown that these errors were again doubled by making the receipts of the railroads the standard for a comparison, instead of the tonnage, when the railroad charges were more than double those on the canals, and that when by this comparison, the proportion alleged was thus reduced to one-eighth, it was subject to further reductions in consequence of more than one half of the freight carried by the railroads being of a character that would prevent it from being carried at all on the canal; that more than one-half of the remainder should be deducted for that portion of the freight carried by the

railroads when the canals were closed, and that of the very small remainder, a very large proportion was local freight, which could not bear the expense of land transportation to the canals; and finally, that the railroads brought a very large amount of business to the canals, far exceeding the amount of all the legitimate canal freight which they carried to market.

In the continuation of this subject, it was found necessary to analyze the present business of the canals, to ascertain the relative proportions of the different kinds of tonnage, and the revenue derived therefrom, and of the receipts and shipments from various localities. For this purpose extensive tables have been prepared, which exhibit for the first time the movement of the different articles, and the error of the deductions made from the tables which have been hitherto published, was shown.

The comparison of the present business with that of each of the last ten years has also been made, and some of the causes for a reduction in the revenues, while the tonnage was so rapidly increasing, have been given.

The incapacity of the canal to perform the business has led to the diversion of a portion of the western trade by the way of Oswego, which, with the reduction of the tolls, has diminished the revenue, without producing a similar effect upon the tonnage.

The reduction in the amount of the tonnage of vegetable food from this State has been ascribed to the change in the articles cultivated and in the pursuits of the population, by means of which the tonnage of other articles, and the demand for western agricultural products, has been increased, and thus furnished additional reasons for an immediate enlargement of the capacity of the Erie canal, and an assurance that its revenue would thereby be increased to a sufficient extent to repay its cost.

IX.—THE ORGANIZATION OF THE DEPARTMENTS FOR THE CONSTRUCTION
AND MAINTENANCE OF THE CANALS.

The Canal Board is composed of the Commissioners of the Canal fund, the State Engineer and Surveyor, and the Canal Commissioners.

The Commissioners of the Canal Fund have the custody of this fund, and under legislative enactments, provide for the loaning and paying, the receipt and disbursement of all moneys for the construction of new works, and the maintenance of those in operation.

The State Engineer and Surveyor is required to prepare plans for all the public works of the State, estimates of their cost, and descriptions of the manner of performing the work. He is also required to visit and inspect the works in progress, and advise the Canal Board and Canal Commissioners and direct the engineers in charge, in reference to such improvements and in the maintenance of the canals.

It is also a part of his duty to report annually to the Legislature the state of the public works, and the progress made therein, and such suggestions in relation thereto as he may deem proper.

The Canal Commissioners are vested with a general supervision of the canals, and in behalf of the State, are the contracting parties for the construction of new works.

The custody of the public works, and the charge of the maintenance of the navigation on those in operation, are also vested in them.

The Canal Board selects the division, resident, and first assistant engineers; the collectors of tolls, superintendents of repairs, inspectors of boats and weigh masters. This Board determines the charges for tolls and the mode of their collection, and regulates the manner of navigating the canals.

It also approves of the plans for new work submitted by the State Engineer, of extraordinary improvements submitted by the Canal Commissioners, and when directed by the Legislature, ad-

judicates upon claims for extra compensation for damages arising out of the construction and maintenance of the canals.

The Commissioners of the Canal Fund select an Auditor of the Canal Department, who examines and audits all accounts of expenditures for the construction and maintenance of the canals. He gives warrants on the Treasurer for all money required to be paid by the Commissioners of the Canal Fund, and makes an annual report to them of the condition of the Canal Funds, which report they are required to submit to the Legislature.

He is also required to submit annually to the Legislature, an abstract of the tolls, trade and tonnage, as prepared by the collectors of canal tolls.

Organization of the Engineer Department.

The State Engineer assigns to each of the three division engineers a division of the canals corresponding with the division of each Canal Commissioner; and to each resident engineer a subdivision of the same; and to the first assistant engineers such location as he deems proper.

The division and resident engineers select such assistants as are necessary, and the State and division engineers determine the compensation of such assistants.

The division engineer inspects the portion of the canals under his charge, reviews all surveys, plans and estimates made in reference thereto, and causes such surveys, etc., to be made as may be directed by the State Engineer, the Canal Board, or the Canal Commissioner, and submits the same for the examination and approval of the State Engineer.

The resident engineer superintends the construction of all new work, and determines the quantities and the classification to be paid for under the contracts.

It will be observed that, while the State Engineer is nominally placed at the head of the engineer department, and is considered by the public as responsible for the faithful performance of duty by his subordinates, he has no more influence in the selection of

suitable persons for the higher offices than his eight associates of the Canal Board, and has no voice whatever in the selection of the minor officers.

It will be conceded that no other officer of the government is as competent to judge of the professional qualifications of the candidates for appointment in this department, or less likely to be influenced by those considerations which generally govern the selection of political appointments. The experience of the past few years has led me to the belief that a change may be made in the manner of selecting the engineers, with advantage to the public interests.

I therefore respectfully recommend that the State Engineer and Surveyor should be required to nominate the division and resident engineers to the Canal Board for appointment by them; and the subordinate engineers should be selected by the division and resident engineers; and that all engineers shall be subject to removal at any time, for cause, by the State Engineer or by the Canal Board.

X.—THE LETTING OF CONTRACTS.

When the Legislature has directed the construction of any new work and the State Engineer has prepared the plans and estimates and the Canal Board has approved of the same, the Canal Commissioners are required to proceed and contract therefor.

The engineers in charge are first required to prepare estimates of the quantities of the several materials required for the work, and detailed plans and specifications therefor, and to exhibit the same in public to persons proposing for doing the work.

Sealed proposals are then made to the Canal Commissioners containing rates for each of the items estimated by the Engineer. The aggregate value of each of the proposals thus offered is ascertained by using the quantities thus exhibited and the prices thus offered, from which aggregates the Canal Commissioners make the award of the contracts.

After the contracts are executed no changes can be made in the plans of the work that will increase the cost of the work or create other claims against the State, without the approval of the Canal Board.

The manner of letting contracts on other public works constructed by the general and State governments, by municipal corporations, and by incorporated companies, is nearly the same as that pursued in this State.

Under the general government the regulation of the departments require that the award shall be made to the lowest bidder who, has in his offer complied with the terms required, and if he should refuse to enter into contract, that the award should then be made to the next lowest bidder, and the proper officer is required to institute legal proceedings against the failing bidder and his guarantors, for the recovery of the difference between the amount of his bid and that at which the work was subsequently contracted for, and also for all the damages arising from such failure.

The laws of this State require that the Canal Commissioners shall "give public notice of the time and place at which sealed proposals will be received for entering into contracts, which notice shall be published for three weeks in succession in the State paper, and in one or more of the newspapers of each county in which the work to be performed is to be made."

"The proposals for contracts for which sealed proposals are to be offered shall be for a sum certain as to the price to be paid or received, and no proposal which is not thus definite and certain or which contains any alternative condition or limitation as to such price shall be received or acted on. No more than one proposition shall be received from any one person for the same contract, and all propositions of the persons offering more than one for the same object shall be rejected. Every person who shall enter into any contract for the supply of materials, etc., for any canal shall give satisfactory security for the faithful performance of his contract, and if any person having given such security shall neglect or refuse to per-

form his contract, he shall be excluded from any interest in any future contract for the same object."

Considerable discussion has arisen at various times upon the best manner of awarding contracts on the public works.

Incorporated companies have rarely confined themselves to the lowest bidders.

The directors are usually regarded as having so much individual interest in obtaining the best terms, that it has been generally conceded by the stockholders, that the directors should be allowed to exercise their discretion in this matter, and they have accordingly generally been governed in their awards, by the character of the party offering, his skill and known experience in the performance of similar work, and the responsibility of the sureties he has offered, and in many cases, by the opinion of the engineers and other skillful persons of his ability, to perform the work in question on the terms of his offer.

None of the laws of this State have required that the contracts should be awarded to the lowest bidder therefor.

In the early commencement of the canals, when it was difficult to obtain the services of persons experienced in such work, the Canal Commissioners did not in all cases even advertise the work, nor always award the contract to the lowest bidders. It must be remarked, that at that period the State *sought* for experienced contractors, and there was not the same eagerness to obtain contracts as exists at the present day.

With the number of experienced contractors, the anxiety to obtain contracts for the construction of the public works increased, and gradually the Canal Commissioners settled down into an uniform policy, of making the awards to the lowest bidder, who had the experience necessary to perform the work at the least cost.

At all of the lettings on the Chenango canal, and also on the eastern section of the Erie canal enlargement, in the award of the contracts, amounting to nearly ten millions of dollars, the Canal Commissioners maintained the rule which has just been stated.

The objections which have been made against this policy are, that contracts have been taken at prices below the actual cost of the work, with a hope that, by means of allowances by the Canal Board and by special laws of the Legislature, their losses, if any, would be made up, and that thus (the cost of Legislation being added) the work, on which contracts were made with the lowest bidders, would prove more expensive than if it had been originally let at what is called "fair remunerative prices."

These objections are more specious than real.

The chance of failure in these applications for relief is too great a hazard for contractors to take upon themselves, and the cost of obtaining Legislative aid is always so great, that comparatively few contractors undertake to obtain it, except through some channel by which they lose a moiety of their claims.

On an examination of the claims which have been actually allowed, it will be found that they are mainly on account of changes of the plans of the works rendering it more expensive than the original plans, or on account of extraordinary contingencies which occurred after the making of the contract, and which were not contemplated by either party at the letting.

The laws prior to 1849 restricted the Canal Board to these two conditions in making extra allowances to contractors, and they cannot now make any allowances except under the authority of special laws.

Whether the contract has been performed at a loss or a gain to the contractors, justice requires that allowances of this character should be made, and therefore the argument in favor of letting work at what are termed "fair remunerative prices," has no force, from the fact that large allowances have heretofore been made for the causes stated.

No contractor has ever asked from the Legislature an extra allowance based *solely* on the ground that he had a losing contract, and though it is well known to those familiar with the legislation on this subject that this circumstance has had influence

in the passage of such relief laws, yet it is not believed that a single act can be pointed to where it has been the ground of the relief granted.

In departing from the wholesome rule of awarding the work to the lowest bidder, the public officers are plunged into a wide sea of discretion, and are liable to charges of erroneous judgment, and to suspicion of favoritism.

The estimates of the engineers have been claimed as a reliable standard upon which the award of contracts can be made.

These estimates are made up from two elements essentially different in their character, to wit: the quantities of the different kind of work to be done, and the prices therefor.

If the plans of the work are completely matured, and sufficient time is taken and great care used, many of the quantities may be ascertained with precision; but experience has shown that with all the time and care that may be used, and notwithstanding the exercise of the best judgment, it is impossible for the engineer to ascertain the character of the material which lies below the surface of the ground. Where he has anticipated earth, rock may be found; where easy excavation, it may prove to be hard-pan or quicksand; where foundations of timbers are supposed to be sufficient, piling or other more expensive plans may be required.

From a careful examination of the estimates of engineers, it will be found that their insufficiency generally arises from an under estimate of the quantities, and particularly of those of a more expensive character, like rock, quicksand, etc.

It may also be remarked in this connection that the labor of ascertaining the quantities, necessarily devolves upon the junior and less experienced engineers, who are apt to overlook such circumstances as have been above stated, and that the senior engineers can only correct their omissions by bestowing more time than is ever allowed for these preliminary examinations of a work.

The determination of the prices is generally made by the older engineers, and these, when faithfully and intelligently made, are rarely found too low in the aggregate.

Engineers form their opinion of value of work chiefly from observing the cost of similar work done by contractors. By examining the prices offered by the most skillful and experienced contractors for any species of work difficult in its character, it will be seen that they frequently vary from each other fifty per cent in their estimate of the value of work, and hence those engineers who desire to maintain a reputation for judgment always estimate their prices at high rates.

It has been asserted by many persons, who either have not carefully examined the subject, or who have had other objects to subserve, that it always costs the State in the end as much as if the work was let at "fair remunerative prices."

It has been already shown that the award of contracts to the lowest bidders does not necessarily cause any considerable increase in the cost of the work, in consequence of extra allowances which are made by the Canal Board and the Legislature.

When the work is let below the cost of performing it, it will generally be abandoned and relet at higher rates, until cost prices are eventually obtained, and sometimes at prices above its fair value, but such cases are rare.

Enough has been already said to show that there is always great uncertainty in the result of the profitableness of contracts, even when the most skillful and experienced contractors are the bidders regarded. The experience of almost every contractor in this country confirms this opinion. There are but few of these gentlemen who have not occasionally taken contracts at losing rates.

The uncertainty of the result of contracts cannot be too strongly impressed while discussing the question, when a considerable number of contracts is to be let. On whatever plan they are awarded, it will result that some will prove remunerative and

others unprofitable. Of course the higher the rates at which the work is contracted for, the less will be the number of unprofitable contracts.

On an amount of work which has been contracted for in this State, amounting to some twenty millions of dollars, where the awards have been essentially made to the lowest bidders, who had the skill and experience required for the performance of the work, allowances have been made by the Legislature and the Canal Board, to the amount of something less than one million of dollars; and work has been abandoned and relet at prices not quite a million of dollars higher. These allowances and relettings increased the cost of the work referred to, ten per cent more than the amount of the lowest bids.

But it will be observed that the extra allowances for change of plans and unexpected difficulties have been included in the percentage stated, though it has been previously shown that allowances of this character would be paid whether the contracts were taken at profitable or unprofitable rates. And, therefore, that the loss to the State in consequence of letting the contracts to the lowest bidders, does not in the case stated, exceed seven per cent of the whole cost of the work. The engineer's estimate on this work, however, exceeded the offers of the lowest bidders more than fifteen per cent; and, therefore, the State saved eight per cent, or more than a million and a half of dollars, by letting these contracts to the lowest bidders.

The conclusion is, therefore, irresistible, that the true interest of the State is best promoted by awarding contracts to the lowest bidders, though a qualification of considerable importance should be made to this principle.

In the preceding argument, it has been conceded that in nearly all cases, each contract let will eventually cost the State the actual cost of performing the work.

The history of the past has demonstrated this point to be so certain, as to be nearly an axiom. It therefore becomes important to the interest of the State, that the contracts should be given

to parties who have had experience in the construction of similar work, so that they shall be performed at the lowest possible cost.

It is evident that if inexperienced persons are employed, the cost of the work will be greatly enhanced, and according to the axiom above stated, if the work proves unprofitable, the State must eventually pay the loss caused by the want of skill and experience of the contractor.

In the practical working of this qualification, considerable difficulty will be experienced; but a careful examination of the subject will show that it can be carried out without entrusting too much discretion to the agents of the State, and at the same time protect its interests and also those of the competing bidders.

For some years past there has been a growing disposition among contractors, to make large associations for the purpose of undertaking large contracts.

However well these associations may suit the purposes of embarrassed corporations, it is deemed to be entirely at variance with the true policy of the State.

Theoretically the State requires no intermediate agents between itself and the workmen. In practice, it has been found that the workmen will not perform the same amount of labor when working directly for the State, as when superintended by the watchfulness of contractors. The direct employment of the workmen would lead to a vast amount of patronage and favoritism, and produce abuses greater than those now endured under the present system.

It has, therefore, been conceded, that public works can be constructed by contract, if properly guarded, so as to promote the best interests of the State. Bearing in mind, however, that while the direct employment of the workmen is theoretically the true policy, the nearest approach to it is the best, provided the practical objections before stated, can be overcome.

From a long experience, and a careful examination of the subject, it is believed that this will be best accomplished, by dividing the work into as small sections as the circumstances of the case

will admit, and that encouragement should be given to laboring men to enter into contracts either individually or by associations.

Under the present system, the State is subject to the fraudulent combinations of contractors, who by arranging a series of bids, commencing with very low rates, and successively increased, are generally able to obtain the work at high rates, by the purchase of the withdrawal of intermediate offers from other parties, and the successive declension of the lower bidders.

This evil may be remedied, by requiring that the work shall be offered anew for contract, whenever the second lowest bidder declines; and that before an award is made the party offering shall deposit in the treasury, a sum equal to a certain per centage, of the amount of the contract, and which shall be repaid if he completes his contract, or forfeited, if he fails to sign and complete it.

The abandonment of contracts causes much delay and expense. Private corporations and the general and municipal governments require that a per centage shall be retained from the payments due from time to time, to secure the completion of the work, which is forfeited if the contract is not fulfilled.

In this State, the remedy is theoretically provided for, by taking sureties for the faithful performance. As these sureties are never called upon for the payment of the damages caused by the failure of the contractors, this provision is entirely nugatory. It is very questionable whether it would not cost the State more to collect the damages than they would amount to; and it would probably result that the Legislature would be strongly invoked to remit the verdicts, and that it would lead to more embarrassment than any resulting benefit from an enforcement of the bond of the sureties.

The retention of a certain per centage appears to be the best method of obviating the difficulty.

In the commencement of a contract, a considerable investment is required to be made by the contractor for the tools, machinery, &c., for carrying on the work.

The retention of a per centage in the early stages of the work, would prove onerous upon all contractors, except those of considerable pecuniary means. This might be obviated by allowing the Canal Commissioners to pay the contractors the per centage, until it amounted to the value of the investment made by him to carry on the work, and to take an assignment of such tools and machinery for the benefit of the State in the prosecution of the work.

An objection of some weight against the retention of a per centage is, that it discriminates against those contractors of limited pecuniary ability; and also that where the prices correspond nearly with the cost of the work, it compels the contractor to pay a higher interest for the retained money than the State receives, and hence increases the cost.

In the last annual report, I submitted the following remarks on this subject:

"It is believed that the completion of the unfinished canals will be effected at less cost, if the work is so arranged as to avoid the progress of the whole of it at the same time.

"When a moderate amount of work is placed under contract, competition between the bidders induces them to offer the lowest terms.

"When a large amount is offered for contract, it induces many persons to leave other occupations and to engage in one which they have neither the skill nor the experience to conduct in the most economical manner.

"Such persons would lose money at prices at which experienced contractors would make fair profits, and the consequence is an abandonment of the contract and a re-letting at increased rates, and application to the Canal Board and Legislature for remuneration for their losses.

"The history of the construction of every State work shows that the State is compelled, eventually, to pay at least the actual cost, and hence it becomes important for her own interest to have experienced and skillful contractors.

"It may be further remarked that by placing a large amount of work under contract at the same time, the demand for materials, and workmen of particular classes, enhances the cost and adds largely to the expenses of the contractors, and that they will either demand higher prices in their offers, or will subsequently obtain remuneration at the additional expense of legislation.

"In the future prosecution of the enlargement of the Erie canal, those portions requiring the longest time for completion, and such other work as will, when done, be of the most benefit to the navigation either by increasing the capacity of the canal or reducing the cost of transportation, should be first constructed.

XI.—EXPENSES OF THE ENGINEER DEPARTMENT FOR 1853.

The disbursements for each division and subdivision for the year have been as follows:

Division Engineers.	Salary.	Travel.	Total.
Geo. Cole, acting on E. Division	\$200 00	\$684 48	\$884 48
Van R. Richmond, M. do	1,700 00	371 53	2,071 53
John D. Fay, W. do	1,345 83	214 62	1,560 45
Total.....	<u>\$3,245 83</u>	<u>\$1,270 63</u>	<u>\$4,516 46</u>

Resident Engineers.	Salary.	Travel.	To Assistants, and for other purposes.	Total.
Wm. A. Perkins, E.				
S. of E. D.	\$1,500 00	\$435 72	\$7,986 85	\$9,322 57
F. F. Curry, W. S.				
of E. D.	1,500 00	457 36	11,804 33	13,761 69
O. C. Hartwell, E.				
S. of M. D.	1,500 00	263 22	3,708 23	5,471 45
W. B. Vedder, W.				
S. of M. D.	1,500 00	469 74	8,141 03	10,110 77
M. S. Kimball, Os- wego canal,	1,500 00	325 74	4,858 00	6,683 74

	Salary.	Travel.	To Assistants, and for other purposes.	Total.
Richard Vernam, E. S. of W. D..	\$1,500 00	\$432 54	11,234 55	\$13,167 09
George Cole, W. S. of W. D.....	1,500 00	266 88	9,529 21	11,296 00
Total	<u>\$10,500 00</u>	<u>\$2,651 20</u>	<u>\$56,62 11</u>	<u>\$69,813 31</u>
Total expenses for engineering.....				<u>\$74,329 77</u>

The above expenditure as distributed upon each canal, is as follows:

Enlargement of the Erie canal,.....	\$51,465 02
Champlain canal	1,907 41
Black River canal	4,967 42
Oswego canal	6,683 74
Cayuga and Seneca canal.	1,715 33
Crooked Lake canal	130 79
Chemung canal and feeder.....	1,201 99
Genesee Valley canal.....	6,258 27
Total	<u>\$74,329 97</u>

The following statement gives, for the whole department, the number of each rank, and the average number of days each person was employed; the average rate of pay per day, and the whole sum paid to each rank during the year 1853.

Name of Rank.	Num- ber of	Average num- ber of days employed.	Average rate of pay.	Whole sum paid during the year.
Resident engineers.	8	272	\$4 89	\$10,635 64
First assistant engineers. 10		225	3 50	8,916 50
Assistant engineers.	2	149½	3 25	971 75
Second assist. engineers. 36		137	2 67	13,169 75
Surveyors and draftsmen 3		174	2 50	1,298 50
Draftsmen	8	136	2 18	2,367 25
Leveller and draftsman. 1		155	2 00	310 00
Levellers	21	126	2 02	5,365 50

Name of Rank.	Number of	Average number of days employed.	Average rate of pay.	Whole sum paid during the year.
10 Assistant levellers.....	9	101	\$1 75	\$1,589 00
11 Rodman.....	34	124	1.47	6,195 75
12 Tapeman and chainman.	13	111	1 29	1,859 00
13 Axeman.....	12	87	1 20	1,364 00
14 Inspect'rs and Super'tndts	18	117	1.94	4,072 00
15 Rodman and Inspector..	1	236	1.75	413 00
16 Assistant in office.....	2	37½	1.75	131.25
17 Clerks.....	15	129	2 00	3,880 25
18 Stone measurers.....	1	12	2 00	24 00
19 Laborers.....	1	1	1 25	1 25
Total,.....	196			<u>\$62,564 39</u>

The number, period of service, and compensation of the engineers and assistants, who have been employed on each resident's subdivision of each of the public works of the State, during the year 1853, and the expenditure which has been made on account of the engineer department, are given in the annexed table, marked O.

The estimated expenditure for salary, travel and all other expenses of the department for the year 1853, as stated in the last annual report from this office, was \$102,737.25; while the actual expenditure is \$74,329.97, being \$28,407.28 less than the estimate.

This diminution has been caused by the progress of a much smaller body of work, than was contemplated in the beginning of the last year, and the consequent discharge of several engineers.

The following statement shows the cost of engineering and the whole expenditure made by the Canal Commissioners, for the last four years:

	Total paid by Canal Commis's.	Total of Engineering.	Per cent on amt exp'd.
The year 1843,.....	\$805,230 84	\$44,644 28	5.5
" 1844,.....	720,449 93	25,879 26	3.67
" 1845,.....	333,717 68	22,485 25	6.8
" 1846,.....	182,367 30	11,573 86	6.4

	Total paid by Canal Commis's.	Total of Engineering.	Per cent on am't exp'd.
The year 1847,.....	\$166,111 64	\$17,158 28	10.3
" 1848,.....	864,767 36	49,772 96	5.7
" 1849,.....	1,513,862 71	73,431 58	4.9
" 1850,.....	2,132,379 93	102,946 42	4.8
" 1851,.....	1,444,706 71	103,040 23	7.1
" 1852,.....	1,532,398 62	133,699 19	8.9
" 1853,.....	981,492 54	74,229 97	7.6

The canals of the State are assigned to three division engineers, corresponding to the divisions of the canals in charge of each of the Canal Commissioners.

The eastern division embraces the Erie canal, from Albany to the Oneida Lake canal, a distance of..... 135.96 miles.

The Champlain canal,..... 66 "

And the Black River canal and improvement,. 90.12 "

Making a total distance of..... 292.08 "

The middle division embraces the Erie canal, from Oneida Lake to Wayne county, 73 miles.

The Chenango canal,..... 97 "

" Oneida Lake,..... 6 "

" Oswego, 38 "

" Baldwinsville side cut,..... 0 $\frac{3}{4}$ "

" Oneida River improvement, 20 "

" Seneca River towing path,..... 5 $\frac{1}{4}$ "

" Cayuga and Seneca canal,..... 23 "

" Crooked Lake,..... 8 "

" Chemung canal and feeder,..... 39 "

" Cayuga inlet, 2 "

Making a total distance of..... 312 "

The western division embraces the Erie canal from Cayuga county to Buffalo, 155 miles.

The Genesee Valley canal,..... 118 "

Making a total distance of..... 273 "

Making the whole length of the canals and public works of the State, exclusive of feeders, 877.8 miles.

The number of structures, the length and estimated cost of the work under contract, the amount done in 1852, and the amount remaining to be done at contract prices, on each resident's subdivision, and on each of the public works, are given in the annexed table, marked J.

The following is a summary made up from this table:

WORK UNDER CONTRACT.

	Length.		Structures.	Estimated cost.	Amount done in 1853.	Whole amount done.	Amount remaining to be done.
	Miles.	No.					
Erie canal enlargement:							
Section work,	44.68	....		\$1,497,917 88	\$298,424 21	\$1,071,753 30	\$343,164 58
Mechanical structures, .....	.....	60		635,532 08	48,480 00	394,024 00	205,340 00
Erie basin and slips, in the city of Buffalo, .....	.....	....		257,801 00	68,364 00	197,801 00	60,000 00
Champlain canal, (repairs,) .....	.....	3		46,803 95	.....	.....	46,803 95
Black River canal, .....	.....			661,104 53	216,375 00	319,865 00	341,239 52
Oswego canal,	5	27		365,170 00	40,730 00	282,404 00	82,766 00
Genesee Valley canal,	24	31					
Totals,	69.30	121		\$3,464,329 44	\$672,373 21	\$2,265,847 30	\$1,079,314 05

The present condition of the unfinished canals is as follows:

ENLARGEMENT OF THE ERIE CANAL.

	Eastern Divis.			Middle Div.		Western Divis.			Whole of E. Ca.		
	No. of double locks.	No. of single locks.	Length in miles.	No. of double locks.	Length in miles.	No. of double locks.	No. of single locks.	Length in miles.	No. of double locks.	No. of single locks.	Length in miles.
Completed and in use,.....	37	....	91.76	4	24.20	5	12	5.99	46	12	121.95
In progress of construction not included in above,.....	....	....	12.24	3	20.83	....	1	10.58	3	1	43.65
Work not commenced,.....	....	9	31.96	....	23.80	....	4	126.23	....	13	181.99
Totals,.....	....	....	135.96	....	68.83	....	....	142.80	49	26	347.59

NOTE.—Three guard locks are included in the No. of locks on the Western Division.

BLACK RIVER CANAL AND IMPROVEMENT.

	No. of single locks.	Length in miles.
Canal completed and in use,.....	97	33.33
Navigable feeder completed and in use,.....	1	10.29
Canal may be brought into use by spring of 1855,.....	12	2.00
Work not commenced,.....	....	....
Navigable feeder,.....	1	1.38
Improvement of Black river,.....	....	42.50
Total	111	89.50

OSWEGO CANAL.

	No. of single locks.
Completed and in use,.....	5
May be brought into use by spring of 1854,.....	8
In progress of construction and not included in above,....	8
Work not commenced,.....	1
Total,.....	22

On this canal there were originally 24 locks, two have been saved in the reconstruction; but there are also two side locks, one in progress of construction, and one not commenced,

GENESEE VALLEY CANAL.

	No. of single locks.	Length in miles.
Completed and in use,.....	83	88.00
Under progress of construction,.....	29	23.25
Partially completed and abandoned by con- tractors,.....		3.75
Not commenced,.....	2	3.00
Completed during the year 1853, and not in use,.....	4	
Totals,.....	<u>118</u>	<u>118.00</u>

Three guard locks are included in the above number of locks.

Chapter 650 of the Laws of 1853, provided for the "payment of claims upon the treasury for work done and materials delivered to the State, under the direction of the Canal Commissioners and Engineers, in part execution of certain alleged contracts entered into by State officers on the part of the State, in December 1851, in pursuance of act, chap. 485, Laws of 1851."

On the 15th of September, I addressed a circular letter to each of the division and resident engineers, containing instructions in reference to rendering final accounts on the contracts above referred to.

The value of the work done and materials delivered under the said contracts, at relative contract prices, upon each division is as follows:

Eastern division,.....	\$66,037 93
Middle do	30,137 15
Western do	59,324 91
Total,.....	<u>\$155,499 99</u>

The annexed table marked K, shows the value of the work which has been done, and of the materials which have been delivered on the respective jobs at relative contract prices.

Of the above outlay, a portion has been lost to the State in consequence of the decay of the materials delivered, and the exposed condition of the work performed, which, in several instances will be, for the further prosecution of the enlargement, entirely unavailable.

XII.—ESTIMATED COST OF COMPLETING THE ENLARGEMENT OF THE ERIE AND THE UNFINISHED CANALS.

Table L of the Appendix gives the estimated cost of each kind of work not under contract, and which is necessary for the completion of the canals.

The following is an abstract containing the cost for each division :

1st.—ENLARGEMENT OF THE ERIE.

Eastern division,	\$1,250,847 18	
Middle do	1,098,325 11	
Western do	6,172,461 16	
		<u>\$8,521,633 45</u>

Add for work under contract, and remaining to be done on the 1st January, 1854 :

Eastern division,	\$193,569 62	
Middle do	302,584 00	
Western do	39,085 00	
		<u>535,238 62</u>

Total estimated cost of performing the work for the enlargement of the Erie canal, which is exclusive of engineering, land damages, removal of buildings, and miscellaneous expenses, 9,056,872 07

2d.—BLACK RIVER CANAL.

Estimated cost of completing canal to river,	\$57,615 38	
do do river improvement,	83,700 00	
Total,		<u>\$141,315 38</u>

3d.—OSWEGO CANAL.

Estimated cost of completing the enlargement of the locks, the adjoining section work, and other necessary structures (now under contract), . . . \$341,239 53

4th.—GENESEE VALLEY CANAL.

Work not under contract, and which is required to complete the canal,	240,400 00
Amount remaining to be done on work under contract,	82,766 00
Total,	\$323,166 00

XIII.—THE CONDITION OF THE CANALS.

The following returns, from the division and resident engineers, show the present condition of the canals, and suggestions for their improvement and enlargement:

Erie Canal.

Mr. Perkins, resident engineer upon the eastern subdivision of the eastern division, remarks:

"The prism of the canal, which is enlarged, has, for the past season, been in good repair, but one break having occurred, which was caused by the failure of a box culvert under the new canal, on section No. 39.

"A few delays to the navigation have been occasioned by the failure of parts of some of the mechanical structures on this division, but only two of these failures caused serious inconvenience.

"The completion of sections 39 and 48, which were brought into use upon the opening of navigation, has added to the Erie canal one and a half miles of the enlarged prism.

Improvements Required.

"For the purpose of facilitating and securing the navigation of the Erie canal, that portion of it which extends from the lower Mohawk aqueduct to a point four and two-thirds miles west of it

should immediately be enlarged. The channel is so contracted that the wedging of boats is a daily occurrence, and this, by impeding the flow of water, grounds the boats below the wedge, and prevents the movement of those above it.

"The construction of the Printups, Olstona and Lasher aqueducts, and section work necessary for bringing the same into use, will add much to the security of the navigation of this division of the canal.

"They are now under contract, and will undoubtedly be completed during the ensuing season."

Mr. Curry, resident engineer on the western subdivision of the eastern division, remarks: "Navigation was opened on this subdivision, on the 20th day of April, and continued without any interruption, until the 15th day of December, when the water was drawn off, so as to facilitate the enlarging of the canal between Oriskany and Rome. Numerous detentions occur between Rome and Higginsville, on account of the narrow state of the channel, at many points; boats often times wedging and causing considerable delay to navigation. Except the points above named, and that portion not yet enlarged between Canajoharie and Little Falls, on which there is some narrow canal, the subdivision is in good condition. These points should be improved at the earliest moment, either by widening the channel, or enlarging those sections upon which the most serious obstructions occur.

"The increased amount of tonnage passing through the canal the past season, and the introduction of so many boats of the enlarged size, render this improvement imperative, in order to give free navigation. Considerable difficulty has been experienced in maintaining a full supply of water at all times on the long level, owing to the narrow state of the canal at many points. On the 25th of November last, the Canal Commissioners let the remaining section work between Utica and Rome, viz: sections one hundred and twelve, one hundred and twenty and one hundred and twenty-one. These are to be completed by the 1st of July next, and are estimated to cost at contract prices, fifty-seven thousand, four hundred dollars; at the same time the bridges on sections one

hundred and six, and one hundred and twelve to one hundred and twenty-one; culverts on sections one hundred and twelve, one hundred and eighteen, and one hundred and twenty; and the dam, bulkhead and feeder at Rome, were also let.

"Of the section work, on this part of the canal, there yet remain twelve and a quarter miles to complete or enlarge, which is not under contract, and which should be done as soon as possible.

"Twenty-nine bridges yet remain to be enlarged on this subdivision, which are not under contract; most of them are in a very bad condition, and require heavy annual expenditures to maintain them. The plan of enlarging these bridges is recommended to be the same as reported in 1852.

"There are fifteen locks on this portion of the canal; locks numbers thirty-three, thirty-five, thirty-six, thirty-seven, forty-four, forty-five, and forty-six, are double and enlarged; and locks numbers thirty-two, thirty-four, and thirty-eight, forty-two, inclusive, are composed of one new and old lock. They are in a very dilapidated state, and liable at any time to give way, and thereby cause serious detentions to navigation. It is recommended that these be enlarged as early as possible.

"Three waste wiers yet remain to be enlarged, one of them located on section one hundred and twenty, should be put under contract immediately, so that the section work adjoining can be fully completed.

"The construction of the dam, bulkhead and feeder at Rome, will add very much to the convenience of navigation on the long level.

"Culverts remain to be built of the enlarged size, located on sections numbers seventy-five, and one hundred and twenty-six to one hundred and thirty-four, inclusive.

Mr. Richmond, division engineer, remarks: "The length of the middle division of the Erie canal on the enlargement location, is $68\frac{2}{3}$ miles. Of this distance, $23\frac{1}{3}$ miles, extending from a point five miles east from Syracuse, to the west line of the village of Jordan, are fully completed and in use. Nine and

9-100th miles between Chittenango and the Orville feeder, and $4\frac{2}{3}$ miles between Port Byron and Montezuma, are partially completed, and one also in use. One and one-fourth miles now nearly completed will be brought into use on the opening of navigation next spring, making a total of thirty-eight and 15-100ths miles of enlarged canal that will then be in use, and leaving thirty 68-100ths miles to be enlarged, of which six and 40-100ths miles are under contract.

"There are on this division, six double enlarged lift-locks, No. 47 to 52 inclusive. Nos. 47, 48, 49, and 50, are completed and in use. No. 51 is also completed, or nearly so. It is located one mile west of Jordan, at the east end of the Port Byron level of the enlarged canal, and cannot be made available until this portion of the enlarged canal shall have been completed. It has a lift of 5.60 feet, which has been temporarily added to lock No. 52, by raising its side walls with timber and rubble masonry, and connecting it with the navigation of the present canal.

"The old river and mud locks, near Montezuma, have been lengthened and widened, to permit the use of the large class of boats. The locks must necessarily be continued until the aqueduct over the Seneca river, and the work connected with it is brought into use, when they will be discontinued.

"The new canal between Port Byron and Montezuma, including the new double lock at the former place, was opened for use on the fourth day of September last. Its completion was delayed by a succession of freshets in the early part of the season, which overflowed a considerable portion of the line, and by the supposed unhealthiness of the location, rendering it exceedingly difficult to procure laborers to perform the work. The navigation has been greatly improved by the use of this portion of the new canal.

"The aqueduct over the Butternut creek, five miles east from Syracuse, is in a very dilapidated condition, so much so that fears were entertained at one time that it could not be continued in use through the season. It is to be replaced next spring by the new structure, which is now nearly completed.

"An arch culvert on Green Lake, on section No. 156, and one on section No. 189, were placed under contract in November last, to be completed by the first day of April next.

"Those portions of the enlargement, the completion of which is deemed the most important for the interests of navigation, are from Jordan to Port Byron, and from Montezuma to the west end of the level crossing the Seneca and Clyde rivers. The latter portion is now under contract, and is to be completed and brought into use in the spring of 1855, on the plan suggested in my report of last year. It embraces the Seneca river aqueduct and section No. 202 connected with it; a part of section No. 203; a road bridge and arch culvert on section No. 201; also a temporary timber lock to connect the new work with the navigation of the present marsh level of the old canal.

"The aqueduct and section No. 202, were put under contract in September, 1849, and the balance of the work was let in November last.

"The water to supply the Erie canal for a distance of fifteen miles west from Jordan, and seven miles of the Cayuga and Seneca canal, is drawn from the Skaneateles feeder, which is taken into the Erie canal at Jordan. The old canal, between this point and Port Byron, is very crooked, and in many places the channel is quite narrow, and when crowded with boats there is great difficulty in sending forward the requisite quantity of water to keep up the levels and supply the locks.

"The new canal, which is located on an independent line between the above mentioned places, was put under contract in 1850. It embraces sections 189 to 197 inclusive. The mechanical structures located thereon consist of one lock, two aqueducts, nine culverts, twelve bridges, and one waste-weir. Four of the sections and several of the structures have been abandoned by the contractors.

"If the abandoned portions should be relet, and the work resumed early next spring, it could be completed by the opening of navigation in the spring of 1856."

Mr. Vernam, the resident engineer upon the eastern subdivision of the western division, remarks :

"The location upon which the estimates are based was made principally in 1851, and can be seen by reference to maps on file in the office of the State Engineer and Surveyor. The most important changes in location, varying from the present line, occur between east line of Wayne county and Pit Lock, between Lock Berlin and Lyons, and between Macedon and Rochester. On these three portions of the canal there will be about 18 miles of independent line.

"The level from the Macedon upper lock through the Perinton swamp is to be depressed 10 feet, in consequence of which a cut from 12 to 16 feet in depth is encountered for a distance of about six miles.

"This change of level is extended across the vallies of Irondequoit and Allen's creek, for the purpose of reducing the heavy embankments between Fairport and Brighton. Macedon upper lock, 10 feet lift, (double and enlarged) is to be abandoned, in lieu of which a new single lock is to be constructed west of Allen's creek, near the village of Brighton.

	Miles.
"The length of this subdivision, as now navigated, is ...	69.51
The length, adopting location of 1851,	60.79
Distance saved, do	8.72
Enlarged and in use,	3.86
Partially enlarged, in use and not completed, location of 1851,	5.36
Enlarged and partially enlarged, as now navigated,	9.54
Enlarged canal, abandoned by location,	0.33

The plan of constructing the prism of canal is as follows :

"From the east line of Wayne county to the first lock east of Rochester, the mean width to be 62½ feet, depth 7 feet ; from head of lock No. 1 east of Rochester to east end of the Rochester aqueduct, mean width 62 feet, depth 8 feet ; from west end of the Rochester aqueduct to Lyell street, in the city of Rochester, mean width 62

feet ; from Lyell-street to west end of section No. 274 the width to increase westward, so that at the lower lock at Lockport the mean width will be 91 feet. The depth from a point 100 feet west of the Rochester aqueduct to west end of this subdivision to be uniformly 9 feet.

“The inside slopes or face of banks for 30 7-100 miles to be protected by slope walls, for the balance of the line, 21 51-100 miles, the facing of banks to be of timber and plank.

“The surface and bottom lines and depth of water from the first lock east of Rochester, to the west end of the subdivision, are in conformity with a resolution of the Canal Board, dated Sept. 16, 1850. The surface line commencing at a point seven feet six inches above lower mitre sill of lowest lock at Lockport, and descending upon a regular inclination to a point one hundred feet west of the Rochester aqueduct, and seven feet four inches above the bottom level of same ; thence descending to the head of lock number one, east of Rochester, to a point which shall be seven feet above the bottom level of the aqueduct.

“The bottom line of canal commences one foot six inches below the lower mitre sill at Lockport, (or nine feet below the surface line fixed by said resolution,) and descends upon a regular inclination to a point one hundred feet west of the Rochester aqueduct, and one foot eight inches below bottom level of the same ; thence ascending regularly (in a distance of one hundred feet) one foot eight inches to the bottom line and west end of the aqueduct ; thence along bottom line of the aqueduct to the east end of same ; thence to the first lock east of Rochester upon a line of eight feet below top water line as above described.

“Adopting the above described bottom and surface lines, the descent from Lockport to Rochester of the bottom and surface (which are equal) will be three feet eight inches. The bottom of the Rochester aqueduct, a very expensive and permanent structure of cut stone, will be one foot eight inches above new bottom of canal at the west end of the same. The crowns of the arches are on a level with present canal bottom, consequently the height could not well be reduced without taking up and rebuilding the structure, and un-

less this should be done, I consider the depression of canal bottom below a line drawn from present canal bottom at Lockport to the bottom of the Rochester aqueduct as wholly unnecessary. In order to furnish the requisite supply of water, the current eastward can be increased by raising the surface at Lockport, thereby increasing the surface descent. The requisite increased elevation of surface at Lockport, above what is contemplated in the plan adopted by Canal Board, would not probably exceed six inches.

Description of Structures.

"The lift-locks are single, one of ten feet and two of seven four-tenth feet, each with culverts in chamber walls, connecting with and extending from upper recesses to a point twenty feet below lower quoins, each culvert to have valves at connection with upper recesses, and at a point opposite lower recesses, six openings into chamber for filling, and two into canal through wings at foot for emptying the lock. The gates are also to be supplied with the ordinary number of valves. The horizontal joints of face masonry to be one quarter of an inch, and of backing one inch in thickness, being double the size of joints allowed in the original enlarged locks.

"Mud Creek aqueduct, located on section 241, near the village of Palmyra, is to have a trunk and towing path bridge of wood, supported by two piers and abutments of substantial cement masonry. Three openings for the stream, each twenty-four feet wide and nine ten-twelfth feet high. Masonry to rest upon a foundation of timber and plank the full length and width of structure. The trunk to have a water-way of fifty feet in width.

"Aqueduct for crossing the Rochester and Syracuse railroad, located on section 260, near the village of Brighton, is to have a trunk and towing path bridge of wood supported by one pier and two abutments of substantial cement masonry, two openings for railroad tracks of nineteen eight-tenth feet each, measuring on line of canals, or fourteen feet measured at right angles with face of pier and abutments. Spaces for tracks fourteen nine-twelfth feet high. The canal crosses the railroad at an angle of forty-five degrees. The water-way to be seventy feet wide.

"All culverts are to be built upon timber and plank foundations, except where rock occurs of sufficient solidity and durability to support the structure permanently. Ten of the small culverts, with three-foot openings, are to have side and end-walls of cement masonry, and a covering of timber and plank. Eleven others of the same size to be covered with stone flagging. Culverts, with openings exceeding three feet in width, to have semi-circular arches, and such height of jamb walls as may be adapted to their location. The masonry to be of good, durable stone, and so dressed that the horizontal joints of face and arch work will not exceed a quarter of an inch.

"Waste weirs are to be constructed with abutments of cement masonry resting upon timber and plank foundations, covering the entire length and breadth of the structure, the dams and towing-path bridges to be of wood; waste to be from fifteen to thirty feet, as circumstances may demand. Each wier to have suitable gates for discharging water.

"Bridge abutments are to be of good and durable cement masonry, built upon foundations of timber and plank, except where rock occurs; face work above top-water line to be plumb; wings to be built upon a line with face of abutments and step or slope down from level of roadway to tow-path and berme banks, so as to support the slopes of roadway embankments.

"During the year 1852, surveys and estimates were made for enlarging this subdivision upon lines of location varying (between Macedon and Rochester) from the location of 1851. These lines are called south and middle lines.

"The location embracing the south line is the same as that of 1851, from the east line of Wayne county to the west end of sec. 245, near Macedon. From this point to the village of Brighton it follows nearly the present line of canal. From Brighton to the west end of this subdivision, the location corresponds with that of 1851. The estimates upon this line are for fifty-one and a quarter feet mean water way, and seven feet depth from the east line of Wayne county to the west end of section two hundred and forty-five, sixty-one and a quarter feet mean water way, and seven feet depth from the west

end of section two hundred and forty-five to the Rochester aqueduct. At the west end of the aqueduct the mean water way to be sixty-one and one-sixth feet, depth seven and one-third feet, increasing in width and depth westward, so that at Lockport lower lock the mean water way will be sixty-eight and one-eighth feet, and the depth nine and a half feet.

"The location embracing the middle line is the same as that of 1851, from the east line of Wayne co., to the west end of section two hundred and forty-five. From this point westward it follows very nearly the present line of canal to a point about one quarter of a mile east of the village of Fairport, where it leaves the old canal, and runs upon an independent line a short distance south of the village to the "Ox Bow," about one and eight-tenth miles west of Fairport, thence along the old canal one-half mile, thence on an independent line to the east end of Cartersville embankment, leaving the most southern point on the old canal (Bushnell's Basin) about one mile to the left. From the east end of Cartersville embankment to Pittsford lock, the location varies but little from the present canal. From Pittsford lock to the 1st lock east of Rochester, the line is independent of the old canal, touching it at three points only, viz: at Pittsford, Towsey's, and Billinghamurst's. The line from Billinghamurst's to the first lock east of Rochester, passes through Cobb's Hill, leaving Brighton about one and a quarter miles to the right. By the adoption of the middle line there would be lost three enlarged lift locks, two of ten feet each, and one of nine feet, and one and sixty-five one hundredths miles of enlarged canal between the village of Brighton and the first lock east of Rochester.

"The estimates embracing the middle line are for a mean water way of fifty-one and a quarter feet, and depth seven feet from the east line of Wayne co., to the Pittsford lock, which is to be located about one and three-quarter miles west of Pittsford. From Pittsford lock to the east end of the Rochester aqueduct, mean water way fifty-nine and a quarter feet, depth seven feet. At the west end of the aqueduct, mean water way sixty-one and one-sixth feet, depth seven and one-third feet, increasing in width and depth westward, so that at Lockport the mean width will be sixty-one and one-eighth feet, and depth nine and a half feet.

"By adopting the south line, the estimates for the subdivision embrace fifty-eight and ninety-nine one hundredths miles of canal, (of which one and forty-eight one hundredths is partially enlarged) one aqueduct, two lift locks, forty-two culverts, six waste weirs, and eighty-two bridges; to which is added the cost of completing work under contract, fifty-seven and fifty-nine one hundredths miles to be faced with slope walls, and one and forty-seven one hundredths miles with timber and plank.

"By adopting the middle line the estimates embrace fifty-five and eighty-three one hundredth miles of canal, (one and forty-eight one hundredths of which is partially enlarged,) one aqueduct, five lift locks, forty-seven culverts, four waste weirs, and seventy-seven bridges; to which is added the cost of completing work under contract, fifty two and eight one hundredths miles to be faced with slope walls, and three and seventy-five one hundredths miles with timber and plank.

Comparative estimated cost of this subdivision upon the different locations:

Location of 1851, adopted by Canal Board,.....	\$3,210,814 43
do 1852, embracing middle line,.....	3,146,250 91
do 1852, do south do	<u>2,219,737 69</u>

Comparative estimates of the lines between Macedon and Rochester.

Location of 1851, adopted by Canal Board,.....	\$1,747,451 69
do 1852, middle line,.....	1,792,805 10
do 1852, south do	<u>866,291 87</u>

Comparison of distances for the different lines.

	Miles.
"Length of subdivision as now navigated is,.....	69.51
Length of subdivision by adopting location of 1851, adopted by Canal Board, is	60.79
Length of subdivision by adopting location of 1852, middle line, is	62.24
Length of subdivision by adopting location of 1852, south line, is	67.03

"The subdivision will be shortened by the adoption of the different lines as follows :

	Miles.
"Location of 1851, adopted by Canal Board,	8.72
do 1852, middle line,	7.27
do 1852, south line,	2.48

Macedon to Rochester.

"Length of canal as now navigated between Macedon and Rochester, is	25.78
1st. Location of 1851, adopted by Canal Board, is	18.57
2d. Location of 1852, middle line, is	20.2
3d. Location of 1852, south line, is	24.81

"The distance saved between Macedon and Rochester by 1st line, as above, is

72.1

The distance saved between Macedon and Rochester by 2d line, as above, is

57.6

The distance saved between Macedon and Rochester by 3d line, as above, is

0.97

"The plans of the mechanical structures for the three locations are similar, except for bridge superstructures, which, upon the locations of 1852, are mostly of wood.

"The prism of canal for the two locations of 1852, is not as wide as that adopted in the location of 1851, by the Canal Board, but is considered ample for the business of the canal and for furnishing a requisite supply of water.

"It will be seen that the estimated cost of this subdivision, by adopting middle line location of 1852, is \$64,563.52 less than upon the location of 1851, as adopted by the Canal Board.

"Although the middle line location may be preferable on account of the safety to the navigation, having a less extent of high embankments, I think the difference in distance in favor of the location of 1851, would dictate its adoption in preference to the middle line location.

"The difference in the estimated cost of this subdivision upon the location adopted by the Canal Board, and that embracing the south

line is \$991,076.74 in favor of the south line location. This difference occurs mostly between Macedon and Rochester. The distance between Macedon and Rochester by the location of 1851 is 18 57-100 miles, and the estimated cost is \$1,747,451.67. Distance by south line 24 81-100 miles, and estimated cost \$866,291.87. Making a difference in distance of 6 20-100 miles in favor of the location of 1851, and a difference in cost of \$881,159.82 in favor of the south line."

Mr. Cole's remarks upon the condition of that portion of the Erie canal, between the east line of section No. 12 and the city of Buffalo inclusive, are as follows :

"Farm bridge No. 5 requires new berme abutments. Farm bridge No. 9 should be rebuilt entire. Road bridges Nos. 10 and 13 require new tow path abutments ; road bridges Nos. 14 and 23 should be built anew ; road bridge No. 27 requires new superstructure (it being the principal passage way over the canal in the village of Medina). Road bridge No. 32 should be entirely rebuilt ; road bridges Nos. 40 and 41 require each one new abutment and new superstructure ; road bridges Nos. 44 and 45 require new superstructure. (No. 45 is situated on Exchange street, Lower Lockport.)

"Road bridge No. 46 requires new superstructure and repairs to abutments ; road bridge No. 50 requires new superstructure.

"The canal should be bottomed out from the last line of sect. No. 12 to the village of Albion, a distance of 12 miles. The work under contract at Albion and Medina should be completed this winter. Culverts Nos. 9, 11 and 50 have partially given way this season, causing much delay and expense, and should be rebuilt before the opening of the navigation.

"There should be new docking timber through the village of Lockport. The towing path should be raised and put in repair, between Sulphur Springs and Pendleton. The work under contract at Pendleton should be completed at the earliest possible moment.

"A new tow path and road bridge should be constructed across Tonawanda Creek, at the head of the new canal near Pendleton.

The towing path between Pendleton and Tonawanda should be raised and protected.

"A new tow path bridge, one mile west of Tonawanda, should be built this winter, without fail; a new road bridge at Black Rock should be put up immediately. The pier between Black Rock harbor and Niagara river will require much care and attention.

"Sections one and two in the city of Buffalo should be completed immediately; bridges should be constructed immediately over the Erie canal at Genesee and Court-streets, in the city of Buffalo, also over the Clark and Skinner canal at Perry, Scott, Elk and Ohio-streets.

"All of these bridges should be completed by the opening of navigation next year. The work upon the Erie basin has been suspended in a measure. The State will suffer much from loss of masonry, (it having been left without protection, will be liable to be thrown over by action of the sea) and timber, a great quantity of the latter of which is on hand.

"The increasing business of this city calls for more harbor room for canal boats as well as lake craft, and I would most respectfully recommend the opening of the south channel as the cheapest and most expeditious way to meet these wants."

Champlain Canal.—Mr. Perkins remarks:

"The locks upon this canal at Cohoes, on the Waterford side cut at Fort Miller, Fort Ann, and Whitehall, are all in a very dilapidated condition; the erection of new structures in place of the present ones is necessary for the security of navigation. The Whitehall locks are now under contract, and the work upon them in progress. They will be brought into use on the opening of navigation next year."

Black River Canal.—Mr. Curry remarks:

"The canal is in good order, and no interruption has occurred to navigation during the past season, but little has been done towards completing the canal to its junction with the river at

Lyon's Fall, Lewis county, owing to the want of means applicable for this purpose. In October last, all the work necessary to be done to complete the same, which was not under contract was let, to be completed by July, 1854.

"The canal is completed and in use as far as lock No. 98. From here to the river, there are yet eleven locks, two sections, three bridges, and a dam over the Black River, just above the falls, yet to be completed.

"The amount of water required to maintain good navigation, renders it necessary a portion of the season, to use all the water afforded by Black River."

Oswego Canal.—Mr. Kimball, resident engineer, remarks :

"The walls of eight additional enlarged locks have been completed. Five of them, together with section No. 38, at Oswego, and lock 18, built in 1850, are to be brought into use next spring. Two guard locks are also to be built this winter, to be brought into use at the opening of navigation."

"The remaining locks, except guard lock No. 2, are under contract, to be completed by the 15th of April, 1855.

"Cutting off Rock Point, at Fulton, and completing the work to lock 9 below, has been put under contract, to be finished at the opening of navigation.

"Act chap. 59, Laws of 1853, authorizes and requires the Canal Commissioners to enlarge the culvert at Salina sufficient to prevent the overflow of adjacent lands, by reason of the banks of the Oswego canal. The culvert has accordingly been put under contract, to be built this winter."

Canal at Baldwinsville.—"The guard lock was finished and brought into use last spring. Some improvement to the tow path above and below, was also made.

"The bridge over the canal in the village, is old and out of repair, and should be rebuilt.

"Much trouble has been experienced the whole season from the lock at the foot of the canal. It is a very old wooden structure, and fears are entertained of its failure."

Genesee Valley Canal.—Mr. Vernam, the resident engineer, remarks as follows :

"The part completed and in use embraces 77 miles of the main line, from Rochester to the Genesee River feeder, at Oramel, Allegheny county, and the Danesville branch of 11 miles, making 88 miles of navigable canal.

"The contracts on the unfinished portion are well advanced, and can be completed next season, provided the necessary funds should be furnished."

Rockville Reservoir.—Since the last annual report of the division engineer was made, the outlet of the Rockville reservoir has been washed away, making an extensive breach. A contract has been entered into for repairing the breach and constructing a new outlet at another point, which will render the work much more safe and permanent.

"This work is to be completed before the opening of navigation next spring. The distance from Oramel to Rockville reservoir is 5 miles ; the section work between these points is nearly finished. The locks are completed, with the exception of the valves and fixtures. This part of the line may be finished by the opening of navigation next spring, and can be used during a portion of the season when the supply of water from the reservoir is sufficient.

"By referring to the last annual report of the division engineer, you will find a statement of the supply of water required for the unfinished portion of the canal, and the sources from which it is to be obtained.

"The Genesee river dam, at Mount Morris, which was partially swept away in the spring of 1852, and rebuilt under the supervision and direction of John D. Fay, Esq., late division engineer, has withstood the freshets of the past year without the least injury."

No additional surveys for the enlargement of the Erie, or for the completion of the unfinished canals having been made since 1852, I respectfully refer to the description of the several plans, and the changes which were recommended in the last annual report.

WM. J. McALPINE.

APPENDIX.

TABLE A.

Of the length of navigation on the Atlantic and lake coast, by the lakes, rivers and canals, and the length of completed railroad lines in the State of New-York.

1st.—Length of Coast Lines:

	Miles.
Around Long Island on the Atlantic and Sound,.....	300
“ Staten “ “ “	30
Along New-York and Westchester counties on Long Island Sound,.....	50
Lake Erie, from North-East to Tonawanda,.....	70
“ Ontario, from Fort Niagara to Cape Vincent,.....	200
“ Champlain, from Whitehall to Rouse's Point,.....	95
Total length of Coast Line,.....	745

2d.—Length of navigation on the Minor Lakes:

Lake George,.....	35
Oneida lake,	20
Skaneateles lake,.....	15
Owasco “	12
Cayuga “	40
Seneca “	30
Crooked “	25
Canandaigua “	14
Chatauque “	15
Total length of Lake Navigation,.....	206

3d.—Length of Navigable Rivers:

Hudson, from New-York to Waterford,	155
St. Lawrence, from Cape Vincent to St. Regis,.....	90
Total length of Navigable Rivers,	245

4th.—Length of Canals:

	Miles.
Erie,	364
Chenango,	97
Black River—Rome to Highfalls (completed 33 miles),	47
“ Improvement to Carthage,	42
Oneida lake,	6
Oneida River Improvement,	20
Oswego,	38
Cayuga and Seneca,	23
Crooked lake,	8
Chemung canal and feeder,	23
“ feeder,	16
Genesee Valley (completed 88 miles),	118
Champlain canal,	64
Glen's Falls feeder,	15
Length of State Canals,	877
Delaware and Hudson Canal,	108
Junction Canal to the Chemung,	12
Total length of Canals,	997

5th.—Length of completed Railroads:

Albany and West Stockbridge,	38
do Northern,	32
Buffalo, Corning and New-York,	134
do and New-York city,	91
do and Niagara Falls,	22
do and State Line,	69
do and Lockport,	26
Canandaigua and Elmira,	49
do do Niagara Falls,	99
Cayuga and Susquehanna,	35
Chemung,	19
Corning and Blossburgh,	41
Champlain and St. Lawrence,	47
Hudson River,	144
do and Berkshire,	32
Long Island,	95

	Miles.
New-York Central,	510
New-York and Erie,	465
do Harlem,	131
do New Haven,	61
Northern,	118
Oswego and Syracuse,	35
Plattsburgh and Montreal,	28
Rensselaer and Saratoga,	25
Saratoga and Schenectady,	22
do Washington,	48
Sacket's Harbor and Ellisburg,	18
Troy and Greenbush,	6
do Boston,	85
do Rutland,	17
do Bennington,	5
Troy Union,	12
Union,	1
Watertown and Rome, ..	96
	<u>2,591</u>

TABLE B.

Of the length of navigation by lakes, rivers, and canals, and the length of completed railroad lines west of the State of New-York.

1st.—Western lakes:

	Area square miles.	Miles wide.	Miles. long.
Ontario,	6,300	40	180
Erie,	9,600	80	270
Detroit river, .....	.....	..	25
St. Clair,	360	25	20
St. Clair river, .....	.....	..	32
Huron,	20,400	100	270
Georgian Bay,			
Mackinaw straits, .....	.....	..	...
Michigan,	22,400	83	340
Green Bay,	2,000	..	...
St. Mary's river, .....	.....	..	46
Superior,	32,000	135	420

Total length of lake navigation, 1,603

The whole length of the lake coast is 5,000 miles, of which 3,000 is in the United States.

2d.—Length of steamboat navigation on the western rivers, after slight improvements are made:

	Miles.	Miles.
Mississippi, (above Cairo)		976
Illinois,	245	
Des Moines,	250	
Iowa, imperfect,	110	
Rock, do.	250	
Wisconsin,	180	
	<u> </u>	1,035
		<u>2,011</u>

	Miles.	Miles.
Missouri, imperfect,		1,500
Osage, imperfect,	275	
Kansas, do	150	
Yellowstone, do	300	
		<u>725</u>

Whole length of steamboat navigation of the Mississippi, 4,236

Ohio,	•	959
Tennessee, imperfect,	720	
Cumberland, do	400	
Wabash, do	400	
Greene, do	150	
Kentucky,	62	
Sciota,	50	
Big Sandy,	50	
Kanawha,	65	
Muskingum,	70	
Monongahela,	60	
Alleghany, imperfect,	200	
		<u>2,227</u>

Whole length of steamboat nav'n of the Ohio and branches, 3,186

3d.—Western canals and river improvements :

Beaver and Erie canal, from the Ohio river, at Beaver, to Lake Erie, at Erie,	136
Ohio canal, from the Ohio river at Portsmouth to Cleve- land, on Lake Erie,	324
Mahoning canal, and Pennsylvania and Ohio canal, con- necting Ohio canal with the Beaver and Erie,	85
Sandy and Beaver canal, connecting Ohio canal and river,	76
Muskingum improvement, do	91
Hocking canal, do	56
Walhending canal, a branch of the Ohio canal,	25
Miami canal, from the Ohio river at Cincinnati, to Wa- bash canal, and thence to Lake Erie, at Toledo,	251
Wabash and Erie canal, from the Ohio river at Evans- ville to Lake Erie at Toledo, 467 miles, 70 of which were included in the length of the Miami canal, leaving	397

	Miles.
Whitewater canal, from the Ohio river at Lawrenceville to the National road,.....	68
Illinois and Michigan canal, from Lake Michigan at Chi- cago to the Illinois river at Peru,	100
Louisville canal, around the falls of the Ohio river,.....	3
Total,	1,612

Railroad lines completed west of New-York :

Niagara Falls to Detroit,.....	229
Detroit to Pontiac,.....	25
Chicago,.....	278
New-York State line to Cleveland,	114
Cleveland to Pittsburgh,.....	101
Cincinnati,	255
Indianapolis,	281
Toledo, two lines,	172
Toledo to Chicago,.....	247
Chicago to Fond Du Lac, opened,.....	25
Galena (nearly complete) on the Miss.,....	210
Lasalle, via Aurora,	100
Rock Island, on the Miss.,.....	180
Springfield and Naples, opened for	81
Alton and St. Louis, "	257
Cairo, "	116
Sandusky to Springfield,.....	134
Newark,	116
Cincinnati to Parkersburgh (opened),.....	60
Marietta,	77
Zanesville and Wheeling (opened),.....	59
Chicago (opened),.....	92
Dayton and Indiana line, and thence to In- dianapolis,	157
Lexington and Louisville,.....	190
Indianapolis to Peru,	73
Lafayette,	64

	Miles.
Indianapolis to Terre Haute,.....	73
do Richmond and New-Albany, .	209
Madison,.....	86
Jeffersonville, &c.,.....	140
Lawrenceville,	90
	<hr/>
	4,291
	<hr/>

TABLE D.

Analysis of the present business of the New-York Canals.

Items.	Per centage of the whole—1852.		Per centage of the whole—1853.	
	Tonnage.	Tolls.	Tonnage.	Tolls.
Of all the canals,.....	100	100	100	100
Of the Erie,.....	.55	.89	.52	.75
Champlain,.....	.13	.04	.14	.03
Oswego,.....	.18	.03	.18	.13
,Cayuga and Seneca,.	.02	.01	.01	.02
Chemung,.....	.05	.00	.06	.04
Crooked Lake,.....	.01	.00	.01	.01
Chenango,.....	.01	.01	.02	.00
Genesee Valley,....	.03	.01	.04	.02
Black River,.....	.01	.00	.01	.00
Oneida Lake,.....	.01	.00	.01	.00
Of all the canals,.....	100	100	100	100
Arriving at tide water,....	.58	..	.59	..
Leaving " ....	.13	..	.14	..
Shipped elsewhere,.....	.29	..	.27	..
Of all the canals,.....	100	100	100	100
Shipped at Hudson River,..	..	..	..	..
Lake Erie,.....	.19	..	.19	.27
Oswego,.....	.09	..	.12	.13
Whitehall,.....	.03	..	.08	.02
on Chemung canal,.	..	..	.06	.04
Of all the canals,.....	100	100	100	100
Tonnage f'm West'n States,.	.33	..	.32	..
this State,....	.67	..	.68	..
Of all the canals,.....	100	100	100	100
Products of forest,.....	.41	.14	.43	.18
animals,.....	.02	.02	.02	.03
Vegetable food,.....	.29	.45	.25	.40
Other agricultural products,	..	..	..	..

	Per centage of the whole—1852.		Per centage of the whole—1853.	
	Tonnage.	Tolls.	Tonnage.	Tolls.
Manufactures, .....	.06	.03	.05	.04
Merchandise, .....	.11	.21	.11	.22
All other articles, .....	.11	.04	.14	.04
Of all the canals,	100	100	100	100
boards and scantling, ...	.24	.10	.27	.13
timber, .....	.03	.02	.04	.03
staves, .....	..	..	..	..
wood, .....	.14	..	.08	..
ashes, .....	..	..	..	..
flour and wheat, .....	.19	.32	.18	.31
wheat, .....	..	..	..	..
corn, .....	.05	.07	.03	.04
barley, .....	.01	.02	.01	.02
oats, .....	.02	.02	.02	.02
Domestic salt, .....	.03	.01	.03	.01
Railroad iron, .....	.03	..	.04	..
Stone, lime, and clay, .....	.04	.01	.05	.01
Coal, .....	.03	..	.05	.01
Sundries, .....	.02	.02	.02	.02
Tolls collected on all the canals, .....	..	100	..	..
At New-York, Albany, and West Troy, .....	..	.26	..	..
At Rome, .....	..	.02	..	..
Syracuse, .....	..	.02	..	..
Montezuma, .....	..	.02	..	..
Rochester, .....	..	.05	..	..
Lockport, .....	..	.04	..	..
Tonawanda, Black Rock and Buffalo, .....	..	.32	..	..
Oswego, .....	..	.10	..	..
Whitehall, .....	..	.02	..	..
Geneva, Pennyman, and Dresden, .....	..	.02	..	..
Havana, Horse-heads, and Corning, .....	..	.03	..	..

TABLE E.

Trade upon the canals for the year 1853, embracing the tonnage, tolls, and the movement of the tonnage, being the equivalent number of tons moved one mile.

	Tons.	Tolls.	Rate of toll per 2,000 lbs. per mile.			Number of tons moved one mile.
			C.	M.	Fr.	
THE FOREST.						
Fur and peltry,	425	\$548	2	....	....	27,400
Product of wood:						
Boards and scantling,	1,165,354	403,952	....	2	4	168,313,333
Shingles,	23,264	5,806	....	3	....	1,935,333
Timber,	173,074	85,750	....	2	4	35,729,166
Staves,	86,792	51,911	....	2	....	25,955,500
Wood,	365,123	9,791	....	1	5	6,527,333
Ashes, pot and pearl,	7,493	13,541	....	8	....	1,687,625
Total of the forest,.....	1,821,525	\$571,299	....	....	....	240,175,690
AGRICULTURE.						
Product of animals:						
Pork,	20,032	\$21,724	....	3	....	7,241,333
Beef,	15,592	25,055	....	6	....	4,175,833
Bacon,	10,012	13,843	....	3	....	4,447,666
Cheese,	6,016	3,045	....	3	....	1,015,000

Butter,.....	3,679	8,882	.....	6	.....	647,000
Lard, tallow and lard oil,.....	6,669	6,011	.....	3	.....	2,009,300
Wool,.....	4,035	9,106	.....	8	.....	1,138,950
Hides,.....	4,577	5,706	1	.....	.....	570,600
Total product of animals,.....	70,612	\$87,872	.....	.....	.....	21,238,973
VEGETABLE FOOD.						
Flour,.....	370,914	\$565,744	.....	6	.....	94,290,666
Wheat,.....	382,588	433,218	.....	6	.....	72,203,000
Rye,.....	7,878	5,172	.....	6	.....	862,000
Corn,.....	121,248	134,933	.....	4	.....	33,733,222
Corn meal,.....	481	892	.....	4	.....	223,000
Barley,.....	65,427	76,204	.....	6	.....	12,700,666
Oats,.....	71,883	54,511	.....	4	.....	13,627,750
Bran and ship stuff,.....	27,371	21,889	.....	4	.....	5,472,250
Peas and beans,.....	3,131	3,128	.....	6	.....	521,333
Potatoes,.....	19,734	2,897	.....	2	.....	1,448,500
Dried fruit,.....	645	1,052	.....	8	.....	131,500
Total vegetable food,.....	1,071,300	\$1,299,640	.....	.....	.....	234,913,887
ALL OTHER AGRICULTURAL PRODUCTS.						
Cotton,.....	3,345	\$758	.....	2	.....	379,000
Unmanufactured tobacco,.....	3,067	2,046	.....	8	.....	255,750
Hemp,.....	531	325	.....	2	.....	162,500
Clover and grass seed,.....	967	2,230	.....	8	.....	278,750

TABLE E.—(CONTINUED.)

	Tons.	Tolls.	Rate of toll per 2,000 lbs. per mile.			Number of tons moved one mile.
			C.	M.	Fr.	
Flax seed,.....	917	\$938	....	8	....	117,253
Hops,.....	185	280	....	8	....	35,000
Total all other agricultural products,....	9,012	\$6,577	....	....	....	1,228,253
Total agriculture,.....	1,150,923	\$1,394,089	....	....	....	257,381,112
MANUFACTURES.						
Domestic spirits,.....	21,058	\$28,876	....	6	....	4,812,666
Oil meal and cake,.....	8,493	7,654	....	4	....	1,913,500
Leather,.....	4,773	4,087	....	8	....	510,875
Furniture,.....	3,030	2,996	....	6	....	499,333
Bar and pig lead,.....	159	25	....	8	....	3,125
Pig iron,.....	31,211	24,723	....	4	....	6,180,750
Bloom and bar iron,.....	7,014	2,842	....	4	....	710,500
Castings and iron ware,.....	18,773	25,845	....	6	....	4,307,500
Domestic woolsens,.....	91	121	....	8	....	15,125
Domestic cottons,.....	982	809	....	8	....	101,125
Domestic salt,.....	130,731	24,070	....	2	....	12,035,000
Foreign salt,....	3,021	2,273	1	....	....	227,300
Total manufactures,.....	230,036	\$124,321	....	....	....	31,316,799

MERCHANDISE.					
Sugar,	38,872	.....	.....	.....	.....
Molasses,	18,836	.....	.....	.....	.....
Coffee,	13,717	.....	.....	.....	.....
Nails, spike and horse shoes,	15,244	.....	.....	.....	.....
Iron and steel,	23,091	.....	.....	.....	.....
Flint enamel, crockery and glass ware,	7,261	.....	.....	.....	.....
All other merchandise,	177,172	.....	.....	8	74,411,666
Railroad iron,	164,134	.....	.....	3	41,525,666
Total merchandise,	458,327	.....	.....	.....	115,937,332
OTHER ARTICLES.					
Live cattle, hogs and sheep,	255	.....	.....	4	37,500
Stone, lime and clay,	202,176	.....	.....	2	13,569,500
Gypsum,	59,153	.....	.....	2	4,918,500
Mineral coal,	225,507	.....	.....	1	26,258,000
Copper ore,	946	.....	.....	1	484,000
Sundries,	99,004	.....	.....	8	10,311,500
Total other articles,	587,041	.....	.....	.....	55,579,000
Total,	4,247,853	.....	.....	.....	700,389,933
Amount collected on empty boats and from pass.					
.....					
.....					
.....					

TABLE F.
Comparison of the business of the canals in 1848, with that of preceding and succeeding years, that of 1848 being used as the standard.

ITEMS.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.
On all the canals—Tonnage,	0.54	0.65	0.71	0.81	1.02	1.00	2,796,230	1.03	1.10	1.28	1.52
Tolls,	0.64	0.75	0.81	0.85	1.12	1.00	3,252,212	1.00	1.01	1.02	0.96
Erie canal—Tonnage,	0.51	0.59	0.65	0.79	1.04	1.00	1,599,965	1.01	1.02	1.22	1.38
Tolls,	0.64	0.74	0.80	0.83	1.13	1.00	2,653,390	1.00	0.99	1.01	0.95
Champlain canal—Tonnage,	0.89	0.91	0.90	0.95	1.06	1.00	293,888	1.09	1.56	1.74	1.80
Tolls,	0.87	0.99	1.01	0.92	1.02	1.00	74,453	1.03	1.14	1.01	0.97
Oswego canal—Tonnage,	0.49	0.66	0.69	0.70	0.89	1.00	490,140	1.14	1.19	1.38	1.39
Tolls,	0.45	0.70	0.73	0.73	0.98	1.00	275,662	1.14	1.23	1.19	1.05
Cayuga and Seneca canal—Tonnage,	0.56	0.67	1.00	1.32	1.26	1.00	46,252	0.87	0.92	0.80	1.02
Tolls,	0.67	0.85	1.13	0.94	1.00	1.00	59,173	0.94	0.93	0.82	0.77
Chemung Canal—Tonnage,	0.44	0.58	0.76	0.83	1.25	1.00	150,697	0.90	0.85	1.06	1.24
Tolls,	0.60	0.89	1.32	0.71	1.03	1.00	83,791	0.97	0.99	0.96	0.98
Crooked Lake canal—Tonnage,	0.93	0.95	1.16	1.04	1.06	1.00	34,155	1.06	1.13	0.86	1.05
Tolls,	0.73	0.82	1.07	1.05	1.07	1.00	27,434	0.98	0.93	0.81	0.75
Chenango canal—Tonnage,	0.54	0.89	1.08	1.16	1.25	1.00	35,207	1.03	1.19	1.14	1.28
Tolls,	0.50	0.89	0.82	0.73	0.89	1.00	20,947	0.66	0.61	0.56	0.52
Genesee Valley canal—Tonnage,	0.49	0.66	0.75	0.89	0.97	1.00	98,467	0.86	0.91	1.02	1.25
Tolls,	0.57	0.73	0.86	0.87	0.99	1.00	56,549	0.96	1.04	1.00	0.93
Black River canal—Tonnage,* .....	.....	.....	.....	.....	.....	1.00	.....	.....	.....	.....	.....
Tolls,* .....	.....	.....	.....	.....	.....	1.00	.....	.....	.....	.....	.....
Oneida Lake canal—Tonnage,	0.56	0.55	0.61	0.47	0.65	1.00	47,451	1.26	1.20	0.95	0.93
Tolls,	0.74	0.90	0.95	0.79	0.90	1.00	813	1.19	5.35	11.02	11.76
Arriving at tide water—Tonnage,	0.54	0.67	0.81	0.93	1.21	1.00	1,447,905	1.07	1.16	1.27	1.39
Tolls, .....	.....	.....	.....	.....	.....	1.00	.....	.....	.....	.....	.....

*This comparison cannot be made. Canal opened 1850.

Leaving tide water—Tonnage,.....	0.43	0.53	0.59	0.65	0.87	1.00	329,557	0.96	1.27	1.42	1.58	1.77
Tolls,.....	0.60	0.72	0.77	0.69	0.90	1.00	881,401	1.03	1.04	1.20	1.03	.....
Shipped at Lake Erie—Tonnage,.....	0.45	0.49	0.47	0.80	1.34	1.00	492,280	1.09	1.15	1.43	1.57	.....
Tolls,.....	0.58	0.58	0.58	0.91	1.45	1.00	932,640	0.88	0.89	1.00	1.06	.....
Shipped at Oswego—Tonnage,.....	0.22	0.43	0.45	0.69	0.96	1.00	157,874	1.48	1.74	1.41	2.41	.....
Tolls,.....	0.09	0.14	0.14	0.16	0.22	1.00	225,265	1.25	1.38	1.41	1.40	.....
Shipped at Whitehall—Tonnage,.....	0.93	0.98	0.97	1.21	0.62	1.00	34,528	1.89	3.58	2.33	3.12	.....
Tolls,.....	0.96	1.08	1.12	1.00	1.14	1.00	50,460	1.07	1.42	1.20	1.20	.....
Shipped on Chemung canal—Tonnage,.....	0.44	0.59	0.70	0.83	1.26	1.00	150,697	0.90	0.85	1.07	1.25	.....
Tolls,.....	0.11	0.17	0.25	0.15	0.19	1.00	83,791	0.87	1.18	1.07	1.00	.....
From western States—Tonnage,.....	0.42	0.49	0.49	0.80	1.26	1.00	650,154	1.22	1.41	1.64	1.84	.....
Tolls,.....	.....	.....	.....	.....	.....	1.00	.....	.....	.....	.....	.....	.....
From this State—Tonnage,.....	0.58	0.69	0.77	0.81	0.95	1.00	534,813	0.98	0.99	1.16	1.23	.....
Tolls,.....	.....	.....	.....	.....	.....	1.00	.....	.....	.....	.....	.....	.....
THE FOREST.												
Fur and peltry—Tonnage,.....	3.21	2.53	1.35	1.55	1.22	1.00	421	1.77	1.92	0.58	1.75	1.01
Tolls,.....	1.82	0.90	1.12	1.29	0.84	1.00	1,613	1.31	0.81	0.81	0.71	0.34
Boards and scantling—Tonnage,.....	0.61	0.81	0.81	0.90	1.09	1.00	550,075	1.11	1.36	1.54	1.69	2.10
Tolls,.....	0.61	0.51	0.89	0.93	1.02	1.00	231,534	1.15	1.51	1.56	1.38	1.74
Shingles—Tonnage,.....	0.47	0.49	0.54	0.57	0.67	1.00	25,350	0.73	0.53	0.64	0.67	0.91
Tolls,.....	0.74	0.58	0.97	0.92	1.12	1.00	20,283	0.66	0.85	0.42	0.28	0.29
Timber—Tonnage,.....	0.75	0.76	1.08	1.10	1.12	1.00	68,737	0.93	1.45	1.86	2.05	2.52
Tolls,.....	0.63	0.59	1.32	1.10	1.03	1.00	43,873	0.97	1.02	0.93	1.32	1.95
Staves—Tonnage,.....	0.50	0.81	1.14	1.01	0.89	1.00	64,731	1.29	1.74	1.27	1.32	1.34
Tolls,.....	0.90	1.16	1.63	0.82	0.54	1.00	41,514	1.27	1.51	1.29	0.95	1.25
Wood—Tonnage,.....	0.62	0.75	0.69	0.68	0.83	1.00	367,075	0.86	0.73	0.85	1.09	0.99
Tolls,.....	1.45	1.43	0.96	0.58	0.74	1.00	10,491	0.87	0.91	0.95	1.27	0.93
Ashes—Tonnage,.....	1.92	1.99	1.95	1.30	1.03	1.00	10,491	1.07	1.35	0.90	0.78	0.71
Tolls,.....	2.82	3.05	2.67	1.67	1.24	1.00	18,186	1.16	1.40	0.95	0.95	0.75
Total tons of forest—Tonnage,.....	0.63	0.79	0.81	0.84	1.00	1.00	1,086,880	1.01	1.16	1.28	1.46	1.68
Tolls,.....	0.79	0.98	1.13	0.97	0.98	1.00	367,494	1.11	1.39	1.34	1.24	1.56

TABLE F.—(CONTINUED.)

ITEMS.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.
AGRICULTURE.											
PRODUCT OF ANIMALS.											
Pork—Tonnage,.....	0.68	0.81	0.63	0.81	0.77	1.00	0.96	0.64	0.50	0.78	1.07
Tolls,.....	0.81	0.89	0.62	0.88	0.89	1.00	0.79	0.39	0.32	0.32	0.56
Beef—Tonnage,.....	0.71	0.84	0.99	0.79	1.01	1.00	1.62	1.45	1.19	1.28	1.37
Tolls,.....	0.68	0.78	0.91	0.68	0.84	1.00	1.61	1.57	1.07	0.89	0.91
Bacon—Tonnage,.....	.....	.....	.....	0.23	0.42	1.00	0.94	1.10	1.24	0.99	2.01
Tolls,.....	.....	.....	.....	0.38	0.52	1.00	0.90	0.83	0.79	0.45	1.16
Cheese—Tonnage,.....	0.58	0.62	0.63	0.87	0.91	1.00	0.95	0.79	0.69	0.43	0.27
Tolls,.....	0.56	0.57	0.61	0.80	0.89	1.00	0.98	0.79	0.44	0.16	0.11
Butter—Tonnage,.....	0.89	1.01	1.06	0.96	0.98	1.00	0.85	0.76	0.57	0.41	0.31
Tolls,.....	1.37	1.09	1.14	0.88	1.04	1.00	0.89	0.69	0.38	0.22	0.18
Lard—Tonnage,.....	.....	.....	.....	0.66	0.43	1.00	0.93	0.93	1.01	.....	1.25
Tolls,.....	.....	.....	.....	0.78	0.51	1.00	0.90	0.68	0.73	.....	0.50
Wool—Tonnage,.....	0.67	0.90	1.07	0.96	1.43	1.00	1.47	0.99	1.16	0.83	0.71
Tolls,.....	0.55	0.85	0.99	0.86	1.23	1.00	1.32	1.48	1.34	0.92	0.80
Hides—Tonnage,.....	.....	.....	0.72	0.50	0.85	1.00	5,107	.....	0.87	0.89	0.89
Tolls,.....	.....	.....	0.75	0.44	0.76	1.00	6,177	1.26	1.08	0.96	0.92
Total product of animals—Tonnage,.....	0.56	0.65	0.69	0.79	0.88	1.00	84,768	1.08	0.94	0.75	0.83
Tolls,.....	0.60	0.67	0.68	0.77	0.86	1.00	158,527	1.07	0.89	0.46	0.56
VEGETABLE FOOD.											
Flour—Tonnage,.....	0.64	0.68	0.69	0.95	1.20	1.00	393,961	1.06	1.06	1.04	0.94
Tolls,.....	0.75	0.81	0.85	1.05	1.28	1.00	853,078	1.04	0.98	0.77	1.44
Wheat—Tonnage,.....	0.43	0.52	0.58	0.93	1.18	1.00	216,882	0.97	1.05	0.97	1.76
Tolls,.....	0.35	0.46	0.48	0.89	1.35	1.00	291,055	0.88	1.01	0.76	1.49
Rye—Tonnage,.....	0.14	0.21	0.41	0.88	0.73	1.00	11,703	1.06	0.84	0.81	0.67

Tolls,	0.16	0.24	0.57	1.21	2.23	1.00	5,484	1.02	0.99	1.16	1.19	0.90
Corn—Tonnage,	0.09	0.06	0.06	0.55	1.74	1.00	93,802	1.69	1.11	2.62	1.95	1.29
Tolls,	0.09	0.03	0.03	0.52	1.66	1.00	162,392	1.12	0.76	1.76	1.34	0.83
Barley—Tonnage,	0.30	0.49	0.66	0.86	0.93	1.00	41,211	0.95	1.14	1.33	1.43	1.58
Tolls,	0.29	0.47	0.67	0.85	0.91	1.00	61,436	0.64	0.81	0.93	1.21	1.24
Oats—Tonnage,	0.59	0.58	0.70	1.08	1.09	1.00	33,068	1.25	1.23	1.77	2.46	2.17
Tolls, .....	.....	.....	.....	.....	.....	1.00	54,863	.....	.....	.....	.....	0.99
Bran and ship stuffs—Tonnage,	0.47	0.62	0.77	0.84	1.16	1.00	21,621	1.24	0.98	1.25	1.56	1.26
Tolls,	0.87	1.33	1.33	0.89	1.22	1.00	17,768	1.22	0.92	1.28	1.52	1.23
Peas and beans—Tonnage,	0.15	0.25	0.78	1.01	1.38	1.00	2,824	1.58	1.04	1.54	1.22	1.91
Tolls,	0.18	0.29	0.82	1.18	1.19	1.00	3,537	1.16	1.19	1.66	0.85	0.88
Potatoes—Tonnage,	0.27	0.18	1.43	1.90	1.14	1.00	3,803	1.82	2.21	4.86	7.07	5.19
Tolls,	1.28	1.24	8.52	2.60	1.86	1.00	703	2.14	2.47	4.78	4.94	4.12
Dried fruit—Tonnage,	0.84	0.89	0.84	0.94	1.57	1.00	1,216	0.45	0.88	0.65	0.25	0.53
Tolls,	0.99	1.29	1.25	0.96	1.92	1.00	820,091	1.12	0.94	1.01	0.12	0.52
Total vegetable food—Tonnage,	0.49	0.54	0.59	0.90	1.23	1.00	1,434,328	0.99	1.07	1.28	1.39	1.30
Tolls,	0.56	0.63	0.67	0.91	1.31	1.00	.....	.....	0.93	0.90	0.98	0.91
ALL OTHER AGRICULTURAL PRODUCTS.												
Cotton—Tonnage,	0.66	0.70	0.72	0.92	0.92	1.00	3,427	0.92	0.63	0.69	0.74	0.98
Tolls,	1.42	1.52	1.46	0.97	0.95	1.00	1,942	0.93	0.49	0.51	0.32	0.39
Unmanufactured tobacco—Tonnage,	1.38	0.70	0.12	1.77	1.28	1.00	1,532	1.59	1.16	1.10	4.14	2.00
Tolls,	2.24	0.97	1.58	1.36	1.25	1.00	2,120	1.31	0.97	1.44	2.10	0.96
Clover and grass seed—Tonnage,	1.89	2.13	2.00	0.65	1.44	1.00	1,139	1.59	0.65	0.31	1.28	0.85
Tolls,	2.43	2.50	1.89	0.61	1.56	1.00	2,653	1.51	0.63	0.27	1.21	0.84
Flax seed—Tonnage,	0.75	1.02	2.07	1.70	1.41	1.00	2,007	0.74	0.51	0.31	1.01	0.45
Tolls,	0.75	0.88	2.49	1.39	1.82	1.00	2,493	0.33	0.26	0.18	1.13	0.38
Hops—Tonnage,	0.56	0.85	0.57	1.18	1.27	1.00	860	1.15	0.66	0.74	0.43	0.21
Tolls,	0.51	0.79	0.58	0.91	1.21	1.00	932	1.21	0.75	0.65	0.55	0.30
All other agricultural products—Tonnage,	0.95	0.97	1.25	1.23	1.19	1.00	8,965	1.10	0.71	0.87	1.52	1.00
Tolls,	1.61	1.43	1.77	1.06	1.41	1.00	10,140	1.04	0.60	0.62	1.19	0.65
Total agriculture | Tonnage,	0.50	0.56	0.61	0.89	1.19	1.00	913,824	1.12	1.06	1.23	1.33	1.26
Tolls,	0.57	0.64	0.68	0.89	1.26	1.00	1,602,995	1.03	0.93	0.88	0.93	0.87

OTHER ARTICLES.

Stone, lime and clay—Tonnage,	0.40	0.38	0.60	0.69	0.68	1.00	128,140	0.99	1.56	1.20	1.29	1.58
Tolls,	0.43	0.55	0.75	0.56	0.68	1.00	22,493	0.96	1.40	1.26	1.37	1.21
Gypsum—Tonnage,	0.35	0.49	0.79	1.04	0.82	1.00	50,632	0.75	0.76	1.08	0.78	1.19
Tolls,	0.54	0.91	1.50	1.04	0.78	1.00	9,213	0.83	0.66	0.79	0.82	1.07
Mineral coal—Tonnage,	0.27	0.40	0.62	0.45	0.85	1.00	75,821	0.93	1.06	1.48	1.92	2.97
Tolls,	2.14	3.27	4.66	0.53	0.96	1.00	15,230	0.90	1.05	1.04	1.25	1.72
Sundries—Tonnage,	0.50	0.70	0.83	0.72	1.22	1.00	76,694	0.97	0.90	1.83	1.10	1.29
Tolls,	0.67	0.99	0.97	0.78	1.60	1.00	102,639	0.99	0.99	0.94	0.69	0.80
Total other articles—Tonnage,	0.38	0.47	0.69	0.66	0.87	1.00	331,287	0.94	1.15	1.44	1.32	1.77
Tolls,	0.77	1.16	1.41	0.73	1.35	1.00	149,575	0.97	1.16	1.13	0.87	0.98

[Senate No. 60.]

TABLE H.

Comparison of the trade passing through the New-York canals and other lines to tide-water.

FOR 1852.	Whole tonnage carried.	Tonnage arriving at tide-water.	Tonnage from the western States.	Tonnage from tide-water to the western States.
The St. Lawrence canals,	600,000	340,000	100,000	40,000
The New-York canals.	3,863,441	2,234,822	1,456,405	294,260
The Pennsylvania canals,	900,000	550,000	100,000	60,000

TABLE H.—(CONTINUED.)

Second. Comparison between the Erie canal and the railroad lines.

FOR 1852.	Whole tonnage carried.	Tonnage shipped from western terminus, east.	Tonnage shipped from eastern terminus, west.	Through tonnage.
Erie canal and contributions from lat. canals, . .	3,332,440	1,264,514	491,243	1,486,261
Northern railroad, New-York,	181,806	100,694	23,165	114,160
Central " "	311,000	43,786	53,859	31,287
New-York and Erie railroad,	456,462	47,574	110,000	46,847
Pennsylvania railroad,	68,978	*20,000	28,483	31,860
Baltimore and Ohio railroad,	231,921	*30,000	*50,000	*25,000
	1,250,167	242,054	265,507	249,154

* Estimated.

NOTE.—After the report was partly printed, the following statement was received in reference to the business of the Baltimore and Ohio railroad, for 1853: "Shipped at Baltimore, westward, 81,316 tons; shipped at Wheeling, for Baltimore, east and west, between Baltimore and Wheeling, 61,070 tons. The road was opened to Wheeling in January, 1853. The Ohio river was only navigable for large boats for four months in 1853. Our business was seriously affected by low water."

TABLE J.

Statement showing the length in miles, number of structures, character of work, estimated cost at contract prices, amount done in 1853, whole amount done and amount remaining to be done, on the eastern subdivision of the eastern division of the enlargement of the Erie canal.

Length in miles.	No. of struct.	Character of work.	Estimated cost.	Amount done in 1853.	Whole amount done.	Amount remaining to be done.
1 08		Section No. 32,.....	\$18,000 00	.....	\$4,446 00	\$13,554 00
	1	San Sai Kill aqueduct on sec. 39,.....	25,950 00	.....	25,950 00	ac't unsettled.
"	2	Bridges on sec. No. 39,.....	3,720 00	.....	3,720 00	"
		" " 66,.....	3,000 00	.....	2,855 00	145 00
1 03		Section No. 48,.....	37,000 00	\$7,595 00	37,000 00	ac't unsettled.
	1	Culvert at Fultonville,.....	10,550 00	.....	10,275 00	275 00
0 76		Sections Nos 58 and 59, (parts of)...	16,987 20	.....	.....	16,987 20
	1	Aqueduct on ".....	11,835 42	.....	.....	11,835 42
0 31		Section No. 60, (parts of).....	6,767 50	.....	.....	6,767 50
	1	Aqueduct on ".....	13,276 50	.....	.....	13,276 50
0 19		Section No. 61, (part of).....	4,020 00	.....	.....	4,020 00
	1	Aqueduct on ".....	12,739 00	.....	.....	12,739 00
		Totals,.....	\$163,845 62	\$7,595 00	\$84,246 00	\$79,599 62

TABLE J.—(CONTINUED.)
Western subdivision of the eastern division of the Erie canal.

Length in miles.	No. of struct.	Character of work.	Estimated cost at con- tract prices.	Amount done in 1883.	Whole amount done.	Amount remaining to be done now under contr't.
9 00 1 00		Sections,.....	\$226,750 00	\$32,430 00	\$144,380 00	\$82,370 00
		Locks,.....				
		Aqueducts,.....				
3		Culverts,.....	3,600 00			3,600 00
		Waste weirs,.....				
		Bridge abutments,.....				
9		Bridge superstructures,.....	17,000 00			17,000 00
		Bridges,.....				
		Valve gates,.....				
2		Dam, bulkhead and feeder,.....	11,000 00			11,000 00
		Total,.....	\$258,350 00	\$32,430 00	\$144,380 00	\$113,970 00

TABLE J.—(CONTINUED)
Eastern subdivision of the middle division of the Erie canal.

Length in miles.	No. of struct.	Character of work.	Estimated cost.	Amount done in 1853.	Whole amount done.	Amount remaining to be done.
10.54		Sections.....	\$248,503 41	\$26,340 00	\$223,960 55	\$24,542 86
	1	Lock, (double).....	35,620 80	1,810 00	33,738 00	1,882 80
		Valve gates and fixtures,.....	1,803 39	.....	1,580 00	223 39
	1	Aqueduct, section 160,.....	20,268 73	2,924 00	16,334 00	3,934 73
	3	Culverts,.....	4,778 38	640 00	1,850 00	2,928 38
	5	Road bridges,.....	10,219 18	1,490 00	8,998 00	1,221 18
			\$321,193 89	\$33,204 00	\$286,460 55	\$34,733 34

TABLE J.—(CONTINUED.)
Western subdivision of the middle division of the enlargement of the Erie canal.

Length in miles.	No. of struct.	Character of work.	Estimated cost.	Amount done in 1853.	Whole amount done.	Amount remaining to be done.
10.29	2	Sections,.....	\$244,487 98	\$29,150 00	\$89,305 00	\$155,182 98
		Locks (double).....	79,956 90	.....	77,920 00	2,036 90
		Raising lock 52, (temporary).....	8,709 00	6,650 00	6,650 00	2,050 00
1		River lock, (lengthening & widening)	5,209 91	4,950 00	4,950 00	259 91
		Mud lock,.....	3,020 48	2,830 00	2,830 00	190 48
		Timber lock on sec. 203, (temporary)	9,306 00	.....	.....	9,306 00
		Valve gates to old river lock and lock No. 52,.....	1,538 19	1,450 00	1,450 00	88 19
2		Aqueducts,.....	204,131 98	1,060 00	124,780 00	79,351 98
6		Culverts,.....	9,865 55	2,245 00	8,642 00	6,223 55
7		Bridges,.....	12,424 57	1,290 00	1,870 00	10,554 57
3		Bridge abutments,.....	3,526 10	1,220 00	1,220 00	2,306 10
2		Bridge superstructures, (iron).....	2,300 00	2,000 00	2,000 00	300 00
			\$584,467 66	\$52,845 00	\$316,617 00	\$267,850 66

TABLE J.—(CONTINUED.)
Eastern subdivision of the western division of the enlargement of the Erie canal.

Length in miles.	No. of struct.	Character of work	Estimated cost at con- tract prices.	Amount done in 1883.	Whole amount done.	Amount remaining to be done.
3 86-100		Sections,.....	\$111,474 00	.....	\$83,000 00	\$28,474 00
	1	Lock,.....	24,673 00	\$2,966 00	17,618 00	7,055 00
	2	Set valves and fixtures,.....	1,325 00	.....	638 00	687 00
	1	Culvert,.....	11,368 00	.....	10,862 00	506 00
	1	Waste weir,.....	1,100 00	.....	758 00	342 00
	2	Bridges,.....	4,318 00	.....	3,122 00	1,196 00
		Removing buildings,.....	3,995 00	.....	3,170 00	825 00
		Totals,.....	\$158,253 00	\$2,966 00	\$119,168 00	\$39,085 00

TABLE J.—(CONTINUED.)
Western subdivision of western division of the enlargement of the Erie canal.

Length in miles.	No. of struct.	Character of work.	Estimated cost.	Amount done in 1853.	Whole amount done.	Amount remaining to be done.
77.09	95	Sections,.....	\$3,064,077 90	\$202,909 21	\$572,661 75	\$2,491,416 15
1.63	2	Sections 1 and 2, city of Buffalo,....	26,000 00	.....	.....	26,000 00
	1	Erie basin and slips in Buffalo,.....	257,801 00	68,364 00	197,801 00	60,000 00
	1	Ship lock at Black Rock,.....	63,412 00	14,955 00	61,412 00	2,000 00
$\frac{1}{8}$	1	Section, including guard lock at Black Rock,.....	26,612 00	.....	.....	26,612 00
	70	Culverts,	148,058 58	.....	.....	148,058 58
	8	Waste weirs,.....	8,912 67	.....	.....	8,912 67
	72	Bridge abutments,	107,294 23	.....	.....	107,294 23
	72	Bridge superstructures,.....	130,438 10	.....	.....	130,438 10
			\$3,832,606 48	\$286,228 21	\$831,874 75	\$3,000,731 73

CHAMPLAIN CANAL.

2	Combined locks at Whitehall,.....	\$39,013 95	.....	.....	\$39,013 95
1	Cohoes bridge,.....	7,790 00	.....	.....	7,790 00
	Total,.....	\$46,803 95	.....	.....	\$46,803 95

TABLE J.—(CONTINUED.)
Black River Canal.

Length in miles.	No. of structures	CHARACTER OF WORK.	Estimated cost.	Amount done in 1853.	Whole amount done.	Amount remaining to be done.
2 $\frac{1}{2}$	.....	Sections,	\$31,000 00	\$857 00	\$14,399 62	\$16,600 38
	11	Locks,	95,000 00	2,790 31	59,035 00	35,965 00
	1	Dam,	5,000 00	.....	.....	5,000 00
	3	Bridges,	2,170 00	590 00	2,120 00	50 00
		Totals,	\$133,170 00	\$4,237 31	\$75,554 62	\$57,615 38
		Am't done on rep, Black River Bridge at Carthage, Jefferson Co.	\$6,986 82	\$6,986 82	\$6,986 82	.....

TABLE J.--(CONTINUED.)

Oswego Canal.

Length in miles.	No. of structures	CHARACTER OF WORK.	Estimated cost at contract prices.	Amount done in 1853.	Whole amount done.	Amount remaining to be done.
5-8	....	Sections,	\$70,975 00	\$30,170 00	\$41,700 00	\$29,275 00
	12	Lift-locks,	409,949 00	159,745 00	243,115 00	166,834 00
	4	Guard-locks,	134,994 00	24,325 00	30,895 00	104,099 00
	1	Composit locks,	19,543 00	1,500 00	1,500 00	18,043 00
	1	Bridge,	564 53	185 00	555 00	9 53
	1	Bridge and iron bridge abutments,	5,440 00	450 00	450 00	4,990 00
	4	Iron bridge superstructures,	8,600 00	.....	.....	8,600 00
	3	Sets valve gates,	1,950 00	.....	1,650 00	300 00
	1	Culvert,	9,689 00	.....	.....	9,089 00
			\$661,104 53	\$216,375 00	\$319,865 00	\$341,239 52

TABLE J.—(CONTINUED.)
Genesee Valley Canal.

Length in miles.	No. of structures.	CHARACTER OF WORK.	Estimated cost at contract prices.	Amount done in 1853.	Whole amount done.	Amount remaining to be done.
23		Sections,	\$118,310 00	\$6,080 00	\$74,740 00	\$43,570 00
1	29	Locks and section 78,	214,800 00	42,450 00	191,870 00	23,430 00
	1	Aqueduct,	5,000 00	.....	4,875 00	125 00
	1	Culvert,	1,910 00	.....	889 00	1,021 00
		Bridges, (number not known,)..	20,150 00	1,200 00	10,530 00	9,620 00
		Outlet for Rockville basin,	5,000 00	.....	.....	5,000 00
			\$365,170 00	\$40,730 00	\$282,404 00	\$82,766 00

TABLE K.

Statement, showing the character and estimated cost at relative contract prices, of work done, or materials delivered under contracts, let December 30th, 1851, for the enlargement of the Erie Canal.

Eastern sub-division of the eastern division.

Character of work.	Amount.
Raising banks of Champlain canal, in consequence of the enlargement of the Erie canal,	\$2,423 32
Section No. 13,.....	264 49
14,.....	409 85
16,.....	6,483 97
17,.....	6,257 80
35, (estimated).....	567 86
40,.....	730 52
41, 42, 44, 45,.....	1,669 69
58,.....	765 59
61,.....	1,155 01
Bridge abutments on sections No. 16 and 17,.....	438 73
Waste weir on section No. 30,.....	768 13
Lock No. 2,.....	5,421 11
Lashers' aqueduct,	2,885 75
Olstona do	2,976 51
Printups' do	1,578 21
	<hr/>
	\$34,796 54

Western sub-division of the Eastern Division.

Section No. 75.....	\$2,224 75
83.....	4,985 17
112.....	2,239 68
126.....	1,453 99
130.....	645 61
131.....	2,412 96
132.....	1,355 22
133.....	.....
134.....	276 40
	<hr/>
	\$15,593 78

NOTE.—The final account of section 35 has not been rendered.

Locks.

	Character of work.	Amount done.	Total.
Lock No. 32	\$778 58	
38	850 00	
39	3,013 79	
40	
42	
		<hr/>	\$4,642 37

Bridge abutments.

Bridge abutm'ts, sec. 26 to 84	\$5,349 95	
between Sprakers' and			
Fort Plain,	.....	1,561 39	
sec. 77	.....	929 62	
		<hr/>	7,840 96

Culverts.

Culverts on sec. No. 111		
sec. No. 112	.....	\$1,094 71	
Dam across Mohawk river at Rome;	...	1,533 98	
Bulkh'd and feeder connected with same,		535 59	
		<hr/>	3,164 28
Total,	.....		\$31,241 39

Eastern sub-division of the Middle Division.

Section No. 137	.....	\$2,581 53	
139	.....	1,661 57	
142	.....	2,168 42	
143	.....	958 48	
144	.....	522 51	
145	.....	1,883 74	
146	.....	2,439 26	
147	.....	3,158 94	
151	.....	3,397 24	
		<hr/>	
Total,	.....		\$18,771 69

Western sub-division of the Middle Division.

	Character of work.	Amount done.
Section No.	193.....	\$561 61
	195.....	4,475 77
	197.....	295 29
	199... ..	2,913 29
	203.....	1,122 33
	204.....	1,791 21
	205.....	205 96
Total,.....		<u>\$11,365 46</u>

Eastern sub-division of the Western Division.

Section No.	207.....	\$1,099 46
	210.....	659 02
	211.....	4,018 68
	212.....	1,054 81
	213... ..	2,394 47
	217.....	3,889 61
	218.....	1,114 56
	229.....	1,896 51
	232.....	2,518 53
	246.....	807 75
251 & 252.....		1,850 00
	254.. ..	75 00
	256.....	3,797 50
	266.....	527 70
Bridge abutments on sec. No. 210.....		95 00
Total		<u>\$25,798 60</u>

Western sub-division of Western Division.

Section No.	278....	\$50 00
	282.....	1,000 00
	300.....	447 00
	316.....	346 02
	317.....	1,003 20
	318.....	3,157 00

Character of work.	Amount done.
Section No. 319.....	\$2,194 00
320.....	761 00
322.....	693 00
325.....	75 00
327.....	1,748 00
330.....	62 21
331.....	302 00
334.....	136 00
348.....	1,047 21
370.....	18,791 57
Total	<u>\$31,813 21</u>

BLACK RIVER CANAL.

Sluices to locks.....	\$861 61
Dams	1,200 00
Delta feeder, section work	815 11
do guard-lock	143 39
Lock houses	550 00
Improvement of Black river.....	1,580 58
Reservoirs	1,568 05
Total	<u>6,718 84</u>

GENESEE VALLEY CANAL.

Oil Creek reservoir.....	<u>\$1,713 10</u>
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TABLE L.
ENLARGEMENT OF THE ERIE CANAL.

Estimated cost of completing the work, which is not under contract.

Eastern sub-division of the eastern division.

Length in miles.	No. of structures.	Character of work.	Estimated cost.
19.89		Section work,	\$538,310 00
	2	Locks,,.....	46,800 00
	2	Waste weirs,.....	9,100 00
		Culverts,	21,900 00
		Road and farm bridge abutments,....	50,000 00
		Road and farm bridges,.....	30,000 00
		Total,	<u>\$696,110 00</u>

Western sub-division of the eastern division.

Length in miles.	No. of structures.	Character of work.	Estimated cost.	Total.
12 $\frac{1}{4}$		Sections,.....	\$326,750 00	
	7	Locks,.....	167,800 00	
	29	Bridges,	43,300 00	
	11	Culverts,	31,300 00	
	28	Valve gates,.....	4,200 00	
	3	Waste weirs,.....	10,560 00	
			<u>\$583,910 00</u>	
		Miscellaneous and temporary damages	36,090 00	
			<u>\$620,000 00</u>	

Included in the above is the work done under contracts, let December 30th, 1851, under act chap. 485, Laws of 1851.

Sections,.....	\$15,593 78
Locks,	4,642 37
Bridges,.....	7,840 96
Culverts,	1,094 71
	<u>\$29,171 82</u>

Total est'd cost of work not under contr't, \$590,828 18

Eastern sub-division of the middle division.

Length in miles.	No. of structure.	Character of work.	Estimated cost.
16.99		Sections,	\$496,928 11
	1	Aqueduct at Chittenango,	18,626 68
	1	Waste weir,	3,448 55
	1	Dam and guard gate,	2,206 78
	22	Culverts,	53,238 36
	16	Bridge abutments and 2 wood super- structures,	28,966 63
	14	Bridge superstructures, (iron)	20,300 00
		Chittenango feeder and structures,...	6,733 56
		Lime stone do ...	15,680 68
		Orville do ...	11,466 78
			<u>\$657,596 13</u>

Western sub-division of the middle division.

7.29		Sections,	\$343,974 39
	2	Aqueducts,	42,695 84
	1	Waste weir,	3,680 99
	8	Culverts,	14,861 63
	10	Bridge abutments,	18,272 50
	11	Bridge superstructures (iron),	15,511 13
		Valve gate for single and double lock,	1,732 50
			<u>\$440,728 98</u>

Eastern sub-division of western division.

53 6-100		Sections,	\$2,550,388 14
	4	Locks,	94,356 83
	4	Set valves and fixtures,	2,658 04
	2	Aqueducts,	49,052 26
	36	Culverts,	154,564 31
	3	Road culverts,	37,780 38
	7	Waste weirs,	9,703 92
	77	Bridge abutments,	143,152 04
	31	Bridge superstructures,	130,073 51
			<u>\$3,171,729 43</u>

For similar table relating to western sub-division of the western division, see page 121 of table J.

BLACK RIVER IMPROVEMENT.

Dam and lock at Otter Creek,.....	\$35,000 00
do opposite Lowville,.....	29,700 00
Dredging and improving channel,....	6,000 00
Dam at Carthage,.....	7,000 00
Total,	\$77,700 00
Estimated cost of constructing two bridges, not yet under contract,.....	6,000 00
Total,.....	<u>\$83,700 00</u>

GENESEE VALLEY CANAL.

Length in miles.	No. of structures.	Kind of work.	Estimated cost.
3		Completing sections 95, 96 and 97; (contract abandoned.)	\$30,000 00
		Ischua Creek reservoir, and 62 chains of feeder,.....	50,000 00
10		Lockhouses,	3,500 00
10		Watch houses,.....	1,000 00
			<u>\$84,500 00</u>

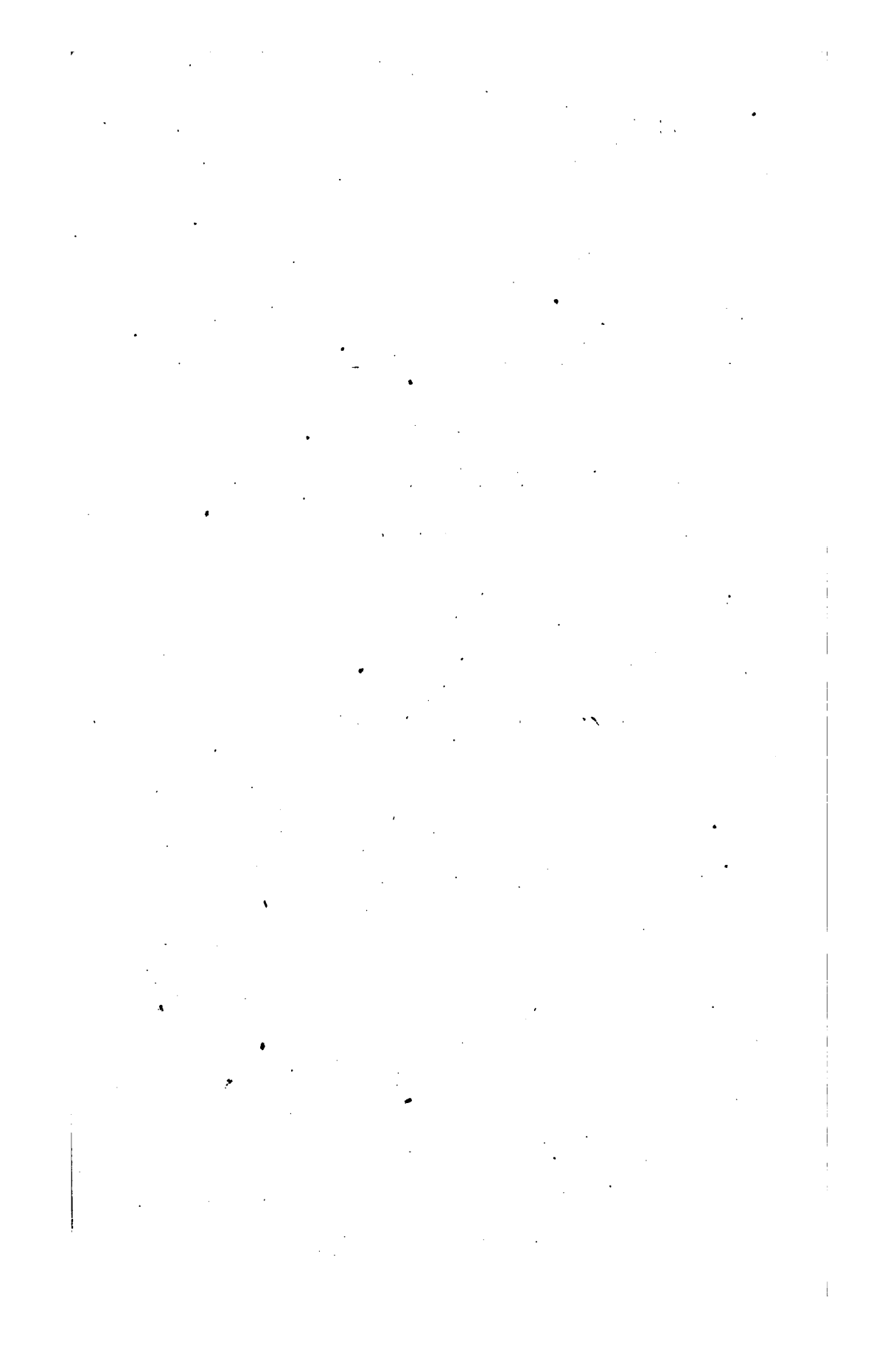


TABLE O.

Statement showing the engineering expenses on the several subdivisions of the canals, during the year 1853. First: eastern subdivision of the Eastern Division enlargement of the Erie canal.

Name and nature of service.	No. of days.	Price per year.	Amount.	Total.
Wm A Perkins, resident engineer,	248	\$1,500 00	\$1,187 50	
do travel, .....	.....	.....	359 70	
		Price pr day.		
Henry Ramsey, 1st ass't engineer,	227	\$3 50	794 50	
L S Nash, 2d do	7	3 50	24 50	
Jas M Rich, do	227	2 50	567 50	
Peregrine White, do	98	2 50	245 00	
do travel, .....	.....	.....	66 75	
Jas McKown, 2d assistant,	134	2 50 & 2 75	352 75	
do clerk,	115	2 25	258 75	
John W Murphy, 2d assistant,	20	3 00	60 00	
Russel D Shepherd, leveller,	52	2 & 2 25	132 75	
Lewis B Martin, do	54	1 75 & 2	102 00	
Edward H Ball, 2d assistant,	6	2 75	16 50	
do leveller,	251	2 & 2.50	546 00	
do travel, .....	.....	.....	42 33	
Edgar M Jenkins, leveller,	42	2 00	84 00	
do rodman,	124	1 50	186 00	
do tapem'n & c'inman	91	1 25	113 75	
do travel, .....	.....	.....	32 54	
John A Barhydt, rodman,	158	1 50	237 00	
D S Olmstead, do	53	1 50	79 50	
Orlando C Perkins, do	79	1 50	118 50	
do tapem'n & chainm'n,	38	1 25	47 50	
J A Becker, do	249	1 25	311 25	
David Vaughan, surveyor and draughtman,	227 2-5	2 50	566 00	
Jos L Harris, surveyor and draughtsman,	112	2 50	280 09	

Name and nature of service.	No. of days.	Price per day.	Amount.	Total.
Augustus Plinta, surveyor and draughtsman,	102½	\$2 50	\$255 00	
D Campbell, clerk,	158	2 37½	375 25	
Total of engineering,				\$7,442 82
Stationery,			\$78 34	
Light,			25 99	
Fuel,			31 88	
Office rent,			94 25	
Postage and telegraph,			88 66	
Miscellaneous,			45 77	
				364
				<u>\$7,807 71</u>

CHAMPLAIN CANAL.

William A Perkins, res. engineer,	65	\$1,500 00	\$312 50	
do travel fees,			76 02	
		Price p. day.		
Russell D Shepherd, 2d ass. eng.,	79	\$2,50	\$197 50	
do leveller,	142	2 00 & 2 25	284 50	
Jas M Rich, 2d ass. engineer, ...	26	2 50	65 00	
John W Murphy, do ..	26	3 00	78 00	
Julian A Watkins, leveller,	44	2 00	88 00	
Jos L Harris, draughtsm. & clerk,	59	2 50	147 50	
David Vaughan, do	20	2 50	50 00	
D S Olmstead, rodman,	39	1 50	58 50	
Jas McKown, clerk,	40	2 25	90 00	
Total of engineering,				\$1,447 52
Stationery,				
Light,			5 13	
Fuel,			17 51	
Office rent,			32 50	
Postage and telegraph,			6 11	
Miscellaneous,			6 11	
Total,				67 36
				<u>\$1,514 88</u>

Eastern sub-division of eastern division, enlargement of the Erie canal, from January 1st to February 15th inclusive, as disbursed by F. F. Curry, resident engineer.

Name and nature of service.	No. of days.	Price per year.	Amount.	Total.
Francis F. Curry, resid. engineer, $\frac{1}{2}$ m'th.		\$1,500 00	\$62 50	
do travel fees,....	....	.....	36 84	
				<u>\$99 34</u>
		Price per day.		
H Ramsay, 1st assist. engineer,..	38	\$3 50	\$133 00	133 00
E H Ball, leveller,...	38	2 00	76 00	76 00
L B Martin, assistant leveller,...	38	1 75	66 50	66 50
P White, 2d assistant,.....	38	2 50	95 00	95 00
J A Barhydt, rodman,.....	17	1 50	25 50	25 50
E M Jenkins, tapem'n & chainm'n,	38	1 25	47 50	47 50
J A Becker, do	38	1 25	47 50	47 50
A Gellespie, axeman,.....	61	1 00	61 00	61 00
P E Sickler, travel fees,.....	..	....	.....	21 62
L S Nash, do	..	....	.....	28 10
James Stewart, sup't and insp'r.,	17	2 00	34 00	34 00
S B King, do	17	2 00	34 00	34 00
				<u>\$769 06</u>

Incidental expenses.

Stationery,.....	60 94	
Light,.....	12 99	
Office rent,.....	6 25	
Postage and telegraph,.....	30 72	
Miscellaneous,.....	7 58	
		<u>118 48</u>
		<u>\$887 54</u>

Chas. p'an Ca. al.

P E Sickler, clerk,	38	\$2 50	\$95 00	
do travel fees,.....	..	....	4 77	
				<u>\$99 77</u>
L S Nash, assistant engineer,....	38	3 50	133 00	133 00
M M Francis, rodman,.....	38	1 50	57 00	57 00
E M Myres, do	23	1 50	34 50	34 50
Chas. M Belknap, clerk,.....	14	2 00	28 00	28 00
W B Gurley, do	11	2 00	22 00	22 00
				<u>\$374 27</u>

Incidental expenses.

Miscellaneous,.....	18 26	
		<u>\$392 53</u>

Western sub division of the eastern division of the enlargement of the Erie canal.

Name and nature of service.	No. of days.	Price per year.	Amount.	Total.
Francis F. Curry, resid't engin'r, 6 ms.		\$1,500 00	\$750 00	
do travel fees,....	.....	.....	512 76	
				\$1,262 76
John L. Dodge, 1st ass't engin'r,	79	Price p. day. 3 50	\$276 50	
do 2nd do	234	2 50	585 00	
				861 50
Egbert Bagg, 1st do	79	3 50	\$276 50	
do 2nd do	201	2 50	502 50	
				779 00
Sylvanus H Sweet, 2nd assistant engineer and clerk,.....	79	3 00	\$237 00	
Sylvanus H. Sweet, leveller,....	79	2 50	197 50	
do do	78	2 00	156 00	
do ass't leveller,	77	1 75	134 75	
				725 25
David M. Green, asst. leveller,...	196	2 00	\$392 00	392 00
Francis K. Field, ass't leveller,..	169	1 75	295 75	295 75
L M Mattice, 2nd ass't engineer,	79	2 50	197 50	
do leveller,	68	2 00	136 00	
do inspector,	73	2 00	146 00	
				479 50
Morris M Francis, leveller,.....	79	2 00	\$ 158 00	
do rodman,.....	192	1 50	288 00	
				446 00
Samuel E Warren, draughtsman,	33	2 00	\$66 00	66 00
Auguste Plinta, do	64	2 50	160 00	160 00
Alphonse Schoppe, do	38	2 50	95 00	95 00
P E Sickler, clerk,.....	12	2 50	30 00	30 00
John Linnebecker, rodman,.....	114	1 50	171 00	171 00
John Gilson, do	79	1 50	118 50	
do axeman,.....	155	1 00	155 00	
				273 50
Asher Lenscott, axeman,.....	150	1 00	\$150 00	150 00
John W Marchart, axeman,....	77	1 00	77 00	77 00
Chas. E. Rice, do	6	1 00	6 00	6 00
David W. Briggs, inspector,....	120	2 00	240 00	240 00
E. P. Curry, do	140	2 00	280 50	280 50
				\$6,790 76

Incidental Expenses.

Stationery,.....	\$207 46
Labor,.....	50 00
Fuel,	75 75

	Amount	Total.
Light,	\$61 96	
Office rent,	166 66	
Postage and telegraph,	83 70	
Miscellaneous,	77 91	
Incidental expenses,		\$723 44
Engineering expenses,		6,790 76
Total,		<u>\$7,514 20</u>

BLACK RIVER CANAL.

Name and nature of service.	No. of ds.	Price pr year.	Amount.	Total.
Francis F Curry, resident engineer, 5½ mos.		\$1,500	687 50	
do travel,			107 76	
				\$795 26
		Price per day.		
Alexander Brown, 2d assistant, ..	316	3 00	948 00	948 00
Jas A Gray, do	313	2 50	782 50	782 50
John P Houghton, leveller,	20	2 00	40 00	40 00
Nelson Rulison, do	2	2 00	4 00	4 00
Geo W Chase, rodman,	75	1 50	112 50	112 50
Philip R Pryme, do	60	1 50	90 00	90 00
H V Hartwell, do	77	1 50	115 50	115 50
Robert Wilson, leveller,	79	2 00	158 00	
do rodman,	79	1 50	118 50	
do tape-man & chainman,	155	1 25	193 75	
				470 25
Samuel Illingworth, do	56	1 25	70 00	70 00
John W Simpson, do	50	1 25	62 50	62 50
Daniel Buck, asst. leveller,	79	1 75	138 25	
do rodman,	25	1 50	37 50	
				175 75
Samuel Budd, rodman	59	1 50	88 50	88 50
L H Mattice, inspector,	65	2 00	130 00	130 00
Ephraim Owens, do	313	2 00	626 00	626 00
Samuel J Davis, do	30	2 00	60 00	60 00
John Vinevier, axeman,	3	1 00	3 00	3 00
J H Taylor, do	41	1 00	41 00	41 00
				\$4,614 76

Incidental expenses.

Stationery,	120 66
Labor,	36 50
Fuel,	22 63
Light,	5 13
Office rent,	71 87
Postage and telegraph,	42 97
Miscellaneous,	52 90
Total,	<u>\$4,967 42</u>

Eastern sub-division of the Middle Division enlargement of the Erie canal.

Name and nature of service.	No. of ds.	Price pr year.	Amount.	Total.
John T Clark, division engineer,	1-24 of yr	\$1,700	\$70 83	
after date of resigna ion,	Allowed by Canal Board.			
L L Nichols, res. engineer, do.	4 days.	\$1,500	16 44	
O C Hartwell, resident engineer,..	1 yr.	1,500	1,560 00	
do travel, .....	.....	.....	263 22	
		Price per day.		
M C Fremire, 1st asst. engineer,..	313	3 50	1,095 50	
D K Hartwell, 2d do	234	2 50	585 00	
David E Whitford, rodman,	33	1 25	41 25	
John Ganswyk, axeman,	234	1 00	234 00	
C W Downes, do	64	1 00	64 00	
James Burke, draughtsman,	155	2 00	310 00	
do do	79	2 25	177 75	
do do	79	2 50	197 50	
E G Nye, clerk,	234	2 00	468 09	
do do	79	2 50	197 50	
			<hr/>	
				\$5,220 99

Incidental expenses.

Stationery, postage and telegraph,.....	\$128 33	
Fuel and light,	64 23	
Labor,	26 50	
Miscellaneous,	31 40	
	<u> </u>	250 46
		<u>\$5,471 45</u>

Western subdivision of the Middle Division of the enlargement of the E. ie canal.

John L Stephenson, 1st asst. engg.	35	\$3 50	\$122 50
Daniel Richmond, do	213	3 50	745 50
Joseph W Clark, do	51	3 50	178 50
Allen C Archibald, asst. engineer,	144	3 25	468 00
Ogden Edwards, 2d asst. engineer,	56	2 50	140 00
Allen C Archibald, do	52	2 50	130 00
Joseph W Clark, do	190	2 50	475 00
Truman J McMaster, jr., do	73	2 50	182 00
Edward B Van Dusen, do	38	2 50	95 00
Luther Eno, leveller,	28	2 00	56 00
Truman J McMaster, jr., leveller,	65	1 75	113 75
do do	63	2 00	126 00
Edward B Van Dusen, do	40	2 25	90 00
Simon P Schermerhorn, rodman,	35	1 50	52 50
Truman J McMaster, jr., do	72	1 50	108 00
Orrin Marvin, do	199	1 50	298 50
David E Whitford, do	44	1 50	66 00

Name and nature of service.	No. of ds.	Price pr day.	Amount.	Total.
William H Bostwick, rodman,....	26	\$1 50	\$39 00	
James Brown, tapeman,	26	1 25	32 50	
Orrin Marvin, axeman,.....	66	1 25	82 50	
Caleb Whiting, inspector,.....	279	2 00	558 00	
Hiram Whiting, do	20	1 75	35 00	
M Smith Waters, do	15	1 75	26 25	
Tecareus Van Debogart, inspector,	128	2 00	256 00	
Wm Burke, draughtsman,	66	2 00	132 00	
Timothy O'Hea do	20	2 00	40 00	
Jonathan C Burnham, clerk,	67	2 00	134 00	
do clerk and asst.	204	2 50	510 00	
Benjamin O Felton, clerk,.....	15	2 00	30 00	
Lemuel S French, do	18	1 75	31 50	
Stephen Doxy, do	6	1 25	7 50	
do do	15	1 50	22 50	
Augustus Kelley, do	54	1 50	81 00	
Patrick Burke, labor weighing valve gates,	1	1 00	1 25	
Wm B Vedder, resident engineer,			959 30	
do travel fees,.....			258 30	
				<u>\$6,684 35</u>

Incidental expenses.

Stationery,.....	\$103 79
Fuel,	65 12
Lights,.....	38 69
Office rent,	113 46
Postage and telegraph,.....	30 50
Miscellaneous,.....	26 75
	<u>378 31</u>
Total,.....	<u>\$7,062 66</u>

CAYUGA AND SENECA CANAL.

Daniel Richmond, 1st ass't eng'r,	34	\$3 50	\$119 00
Joseph W. Clark, do	14	3 50	49 00
Daniel R. Hartwell, ass't engin'r.	79	3 25	256 75
Joseph W Clark, 2nd ass't eng'r,	34	2 50	85 00
Edw. B Van Dusen, 2d ass't eng.,	37	2 50	92 50
Truman J. McMaster, jr. leveler,	13	1 75	22 75
do do	16	2 00	32 00
Edw. B. Van Dusen, do	7	2 25	15 75
Truman J McMaster Jr., rodman,	5	1 50	7 50
Orrin Marvin, do	37	1 50	55 50
David E. Whitford, do	35	1 50	52 50
Almond Gregg do	6	1 50	9 00

Name and nature of service.	No of days.	Price per day.	Amount.	Total.
Orvin Marvin, axeman,	11	\$1 25	\$13 75	
Augustus Whiting, axeman,	16	1 25	20 00	
Caleb Whiting, inspector,	13	2 00	26 00	
M Smith Waters, do	147	1 75	257 25	
Tecarius Van DeBogart, inspector,	3	2 00	6 00	
Timothy O'Hea, draughtsman, ..	57	2 00	114 00	
Jonathan C. Burnham, clerk,	6	2 00	12 00	
do clerk and assistant,	22	2 50	55 00	
Augustus Kelly, clerk,	8	1 50	12 00	
William B. Vedder, res. engineer, ..	..	....	310 15	
do travel fees, .. ..	..	....	57 66	
			<hr/>	\$1,681 06

Incidental expenses.

Stationery,	\$6 07	
Fuel,	9 00	
Light,	3 88	
Office rent,	11 00	
Postage,	1 25	
Miscellaneous,	3 07	
	<hr/>	34 27
Total,		<hr/> <hr/> \$1,715 33

CROOKED LAKE CANAL.

Jos. W Clark, 1st. ass't engineer,	7	\$3 50	\$24 50
Edmund B. Van Dusen, 2nd ass't engineer,	4	2 50	10 00
Truman J McMaster, Jr., 2nd assistant engineer,	6	2 50	15 00
David E Whitford, rodman,	3	1 50	4 50
Timothy O'Hea, draughtsman, ..	8	2 00	16 00
William B Vedder, res. engineer, ..	..	....	43 09
do travel fees, .. ..	..	....	17 70
			<hr/>
Total,			<hr/> <hr/> \$130 79

CHEMUNG CANAL AND FEEDER.

Allen C Archibald, ass. engineer,	76	\$3 25	\$247 00
Ogden Edwards, 2d do	9	2 50	22 50
Allen C Archibald, 2d do	19	2 50	47 50
Ephraim Leach, 2d do	174	2 50	435 00
Simon P. Schermerhorn, rodman,	36	1 50	54 00
William H Bostwick, do	5	1 50	7 50

Name and nature of service.	No. of days.	Price per day.	Amount.	Total.
Thomas McNeil, chainman,.....	1	\$1 25	\$1 25	
Josiah McNeil, do	$\frac{1}{2}$	1 25	0 62	
John King, axeman,.....	2	1 00	2 00	
William Burke, draughtsman,...	14	2 00	28 00	
Timothy O'Hea, do ...	5	2 00	10 00	
Jonathan C Burnham, clerk,....	4	2 00	8 00	
Jonathan C, Burnham, clerk and assistant,.....	10	2 50	25 00	
William B Vedder, res. engineer, ..	..	....	173 10	
do travel fees,....	..	....	136 08	
<i>Incidental expenses.</i>				\$1,197 55
Postage,.....			\$2 57	
Miscellaneous,.....			1 87	
				4 44
Total,.....				<u>\$1,201 99</u>

OSWEGO CANAL.

Joseph French, 1st assistant,....	313	\$3 50	\$1,095 50	
U U Jerome, 2nd do	55	2 50	137 50	
C B Hyde, rodman,.....	313	1 50	469 50	
Christopher Kilts, rodman,.....	212	1 50	318 00	
Bruce Kimball, do	77	1 50	115 50	
do rodman & inspect.	236	1 75	413 00	
Hiram Briggs, inspector,..	126	1 75	220 50	
J V Boomer, tapeman,.....	313	1 50	469 50	
A C Scott, draughtsman,.....	234	2 00	468 00	
do do	79	2 25	177 75	
C H Lusk, clerk,	77	1 50	115 50	
do do	236	1 75	413 00	
Wm. Pollock, measurer of stone at quarry,.....	12	2 00	24 00	
M S Kimball, resident engineer,..	1 year at	\$1,500.	1,500 00	
do travel fees,.....	..	...	325 74	
<i>Incidental expenses.</i>				\$6,262 99
Office rent,.....			\$114 50	
Stationery,.....			82 37	
Postage,.....			19 05	
Telegraph,.....			12 36	
Express,			3 37	
Light,			21 36	
Fuel,			51 16	
Affidavits,			21 79	
Miscellaneous,			94 79	
				420 75
Total,.....				<u>\$6,683 74</u>

*Eas'ern sub-division o' the western division of the enlargement of the
Erie canal*

Name and nature of service.	No. of days.	Price per day.	Amount.	Total.
E S Parker, 1st assistant engineer,	313	\$3 50	\$1,095 50	
Augustus M Leach, 1st ass't eng.,	26	3 50	91 00	
Ethan C Clarke, 1st do	236	3 50	826 00	
do travel fees,....	..	....	34 65	
C G Voorhies, 2d ass't engineer,	2	2 50	5 00	
J Travers Childs, do	121	2 50	302 00	
Henry M Ellsworth, ass't in office,	2	1 75	3 50	
Geo. Arnoldt, draughtsman,....	79	2 50	197 50	
do do	79	2 25	177 75	
do leveller & draughtsm.	155	2 00	310 00	
J M Fairbanks, leveller,.....	2	2 00	4 00	
John H Follett, do	158	2 00	316 00	
do assistant leveller,	155	1 75	271 25	
Laban H Spencer, do	74	1 75	129 50	
Charles Lewis, rodman,	305	1 50	457 50	
Alexander McElroy, rodman,....	2	1 25	2 50	
William B Turner, do	232	1 25	290 00	
Charles H Downing, do	79	1 50	118 50	
Patrick C Buckley, chainman,..	2	1 25	2 50	
Charles H Downing, axeman,....	227	1 25	283 75	
Alfred Randall, clerk,	102	1 50	153 00	
Daniel McHenry, inspector,.....	158	2 00	316 00	
Laban H Spencer, do	77	2 00	154 00	
Richard Vernam, res. engineer,..	13.24 y'r.	\$1500. p.a.	812 50	
do travel fees,....	..	...	258 24	
				\$6,612 64

Incidental expenses.

Stationery,.....	\$76 93	
Fuel,	39 51	
Light,	43 09	
Office rent,.....	45 00	
Postage and telegraph,.....	63 51	
Miscellaneous,.....	28 14	
		296 18
		<u>\$6,908 82</u>

GENESEE VALLEY CANAL.

Augustus M Leach, 1st asst. eng'r	287	\$3 50	\$1,004 50
Geo W White, 2d do	10	2 50	25 00
Hulbert E Brown, 2d do	313	2 50	782 50
Wm Rumble, 2d do	34	2 50	85 00

Name and nature of work.	No. of days.	Price per day.	Amount.	Total.
John A Ditto, 2d ass't engineer,	35	\$2 50	\$87 50	
A C Bishop, 2d do	313	2 50	782 50	
G W Pomeroy, leveller,.....	31	1 75	54 25	
Jas O McClure, do	149	1 50	223 50	
do do	158	2 00	316 00	
Geo W Wilson, assistant leveller,..	158	1 50	237 00	
do rodman,	155	1 25	193 75	
Henry C Belcome, rodman,	103	1 25	128 75	
Lorenzo McClure, chainman,	31	1 12½	34 88	
John K Anderson, clerk,	313	1 75	547 75	
Philip Armstrong, inspector,	111	2 00	222 00	
Joel N Anson, do	84	2 00	168 00	
per annum.				
O W Storey, resident engineer,....	1.10 y'r	1,500	150 00	
do travel,.....	.....	.....	13 20	
Richard Vernam, resident engineer	11.24 y'r	1,500	687 00	
do travel, .....	.....	.....	174 30	
				\$5,917 88
<i>Incidental expenses.</i>				
Stationery,			\$76 65	
Fuel,			44 81	
Light,			79 13	
Office rent,			111 88	
Postage and telegraph,			17 41	
Miscellaneous,			10 51	
				340 39
Total,				<u>\$6,258 27</u>

*Western subdivision of the Western Division of the enlargement of the
Erie canal*

George Cole, resident engineer,....	.....		\$1,500 00	
do travel,.....	.....	.....	266 88	
S F Gooding, 1st asst. engineer, ..	174	3 50	609 00	
John Bisgood, 2d asst. engineer				
and draughtsman,	234	3 50	819 00	
do do	79	4 00	316 00	
John S Vernam, 2d ass.eng. & insp.	8	3 00	24 00	
do do	103	3 50	360 50	
M L Varney, 2nd asst. engineer,..	208	2 50	520 00	
John Dougherty, do ..	173	2 50	432 50	
S A Charles, do ..	79	3 00	237 00	
do do ..	79	3 50	276 50	

Name and nature of service.	No. of days.	Price per day.	Amount.	Total.
Wm G Welch, leveller,	234	\$2 00	\$468 00	
do do	79	2 50	197 50	
John B Benton, do	234	2 00	468 00	
do do	62	2 50	155 00	
John A Lighthall, do	87	1 75	152 25	
H C Ruggles, 2d assistant engineer, ..	77	2 50	192 50	
C Q Newcombe, do	77	2 50	192 50	
C B Morse, do	129	2 50	322 50	
Geo G Smith, assistant in office, ..	73	1 75	127 75	
J S Mix, rodman,	234	1 50	351 00	
do assistant leveller,	79	2 00	158 00	
Albert Ernest, rodman,	287	1 50	430 50	
C F Smith, do	234	1 50	351 00	
do assistant leveller,	79	2 00	158 00	
B M Wood, tapeman,	234	1 25	292 50	
do rodman,	79	1 50	118 50	
N T Smith, tapeman,	42	1 25	52 50	
Wm H Graves, axeman,	13	1 00	13 00	
G H Watson, tapeman,	79	1 00	79 00	
do rodman,	79	1 50	118 50	
A J Tiffeny, axeman,	79	1 00	79 00	
do inspector,	79	1 50	118 50	
S W Bagnall, do	79	2 00	158 00	
G W Bull, clerk,	79	2 00	158 00	
P M Coffee, axeman,	79	1 00	79 00	
			<hr/>	\$10,352 38

Incidental expenses.

Light,	\$29 69	
Fuel,	86 29	
Rent,	308 06	
Postage,	61 76	
Stationery,	237 79	
Telegraph,	94 59	
Miscellaneous,	125 44	
	<hr/>	943 62
Total,		<hr/> <hr/> \$11,296 00

(S.)

Table showing the tonnage of all the articles moved upon the canals during the year 1853, and the actual cost of transporting the same on the canal, and also an estimate of what the transportation of those articles would have cost if they had been carried on the New-York and Erie, and also on the New-York Central Railroad, at their present rates of charges.

ARTICLES.	Ton transport'd	Tolls.	Total revenue, including tolls.	Miles which ton moved on canal.	NEW-YORK & ERIE R. R.		NEW-YORK CENTRAL RR	
					Charge pr ton pr mile.	Total cost of transportation.	Charge pr ton pr mile.	Total cost of transportation.
THE FOREST.								
Fur and peltry,	425	\$548	\$1,214	64	cts. 4.48	\$1,228	cts. 4.70	\$1,288
Boards and scantling,	1,165,354	403,952	894,754	88	1.79	1,807,685	3.15	3,181,122
Shingles,	23,264	5,806	12,880	83	1.79	34,636	3.15	60,963
Timber,	173,074	85,750	189,936	165	1.79	511,642	2.81	803,192
Staves,	86,792	51,911	114,988	299	4.48	1,162,806	2.81	729,350
Wood,	365,123	9,791	21,687	17	3.36	219,318	3.49	227,804
Ashes, pot and pearl,	7,493	13,541	29,993	226	2.46	41,640	2.46	41,640
Total of the forest,	1,821,525	\$571,299	\$1,265,427	.....	.....	\$3,778,955	.....	\$5,045,359
AGRICULTURE.								
PRODUCT OF ANIMALS.								
Pork,	20,032	\$21,724	48,119	361	2.91	\$210,723	2.68	\$194,268
Beef,	15,592	25,555	55,497	268	2.91	121,517	2.68	111,912
Bacon,	10,012	13,343	29,555	444	4.48	199,255	1.70	75,610
Cheese,	6,016	3,045	6,745	169	2.46	24,969	3.35	34,002
Butter,	3,679	3,882	8,599	178	3.36	21,739	3.35	21,645
Lard, fat oil and tallow,	6,669	6,011	13,314	300	1.79	35,866	3.85	67,125
Wool,	4,035	9,106	20,170	282	3.92	44,619	3.85	38,131
Hides,	4,577	5,706	12,639	125	2.46	14,037	3.49	19,814
Total product of animals,	70,612	\$87,872	\$194,633	.....	.....	\$872,725	.....	\$662,505

TABLE S.—(CONTINUED.)

ARTICLES.	Tontransport'd	Tolls.	Total revenue, including tolls.	Miles which 1 ton mo- ved on canal.	NEW-YORK & ERIE R. R.		NEW-YORK CENTRAL RR.	
					Charge pr ton prmile	Total cost of transportation.	Charge pr ton prmile	Total cost of transportation.
					cda.	cda.	cda.	cda.
VEGETABLE FOOD.								
Flour,	370,914	\$585,744	\$1,253,123	254	2.20	\$2,074,395	2.00	\$1,885,813
Wheat,	382,588	433,218	959,578	189	1.90	1,371,857	2.40	1,732,872
Rye,	7,878	5,172	11,456	109	1.90	16,378	2.40	20,688
Corn,	121,248	134,933	298,877	278	1.90	640,933	2.40	809,690
Corn meal,	481	892	1,976	.....	2.70	6,021	2.00	4,460
Barley,	65,427	76,204	168,792	194	1.90	241,313	2.40	304,816
Oats,	71,883	\$4,511	120,742	190	1.90	258,927	2.40	327,066
Bran and ship stuffs,	27,371	21,889	48,484	200	2.23	122,037	2.60	142,279
Peas and beans,	3,131	3,128	6,929	167	4.48	23,356	3.35	17,465
Potatoes,	19,734	2,897	6,417	73	1.79	25,928	3.35	48,525
Dried fruit,	645	1,052	2,930	204	3.36	4,418	3.36	4,418
Total vegetable food,	1,071,300	\$1,299,640	\$2,878,704	.....	.....	\$4,785,563	.....	\$5,298,092
ALL OTHER AGRICULTURAL PRODUCTS.								
Cotton,	3,365	\$758	\$1,679	113	4.48	\$16,979	2.68	\$10,157
Unmanufactured tobacco,	3,067	2,046	4,532	83	3.36	8,593	3.35	8,568
Hemp,	631	325	720	306	3.36	5,460	3.49	5,471
Clover and grass seed,	967	2,230	4,939	288	3.36	9,366	3.49	9,728
Flax seed,	917	338	2,078	128	3.36	3,940	3.49	4,092
Hops,	185	280	620	189	3.36	1,176	3.49	1,222
Total all other agricultural products,	9,012	\$6,577	\$14,568	.....	.....	\$45,514	.....	\$39,438
Total agriculture,	1,150,923	\$1,394,069	\$3,087,910	.....	.....	\$5,503,802	.....	\$5,900,035
MANUFACTURES.								
Domestic spirits,	21,053	\$28,876	\$63,960	229	2.20	\$105,879	2.00	\$96,253
Oil meal and cake,	8,493	7,654	16,954	225	1.79	34,252	3.35	34,102
Leather,	4,973	4,057	9,053	107	3.92	20,026	4.70	24,011
Furniture,	3,030	2,996	6,636	165	4.48	22,370	4.70	23,469

Bar and pig lead,.....	159	25	55	20	1.79	56	3.15	98
Pig iron,.....	31,211	24,723	54,701	198	1.79	110,635	2.81	173,679
Bloom iron,.....	7,014	2,842	6,295	101	1.79	12,718	2.81	19,965
Castings and iron ware,.....	18,773	25,845	57,247	229	1.79	77,104	4.70	202,453
Domestic woolsens,.....	91	121	268	166	3.56	508	3.56	507
Domestic cottons,.....	982	809	1,792	103	2.46	2,488	3.49	3,529
Domestic salt,.....	130,781	24,070	53,315	100	1.79	215,427	2.81	338,184
Foreign salt,.....	3,021	2,273	5,035	75	2.20	5,001	2.81	6,387
Total manufactures,.....	230,036	\$124,321	\$275,371	.....	.....	\$806,464	.....	\$952,637
MERCHANDISE.								
Sugar,.....	38,872	.....	.....	.....	2.46	.....	2.95	.....
Molasses,.....	18,836	.....	.....	.....	2.46	.....	2.95	.....
Coffee,.....	13,717	.....	.....	.....	3.36	.....	3.63	.....
Nails, spikes and horse shoes,.....	15,244	.....	.....	.....	2.46	.....	2.81	.....
Iron and steel,.....	23,091	.....	.....	.....	1.79	.....	2.68	.....
Railroad iron,.....	164,134	.....	.....	.....	1.79	\$743,309	2.68	\$1,112,888
Crockery, glass ware and flint enamel,.....	7,261	.....	.....	.....	4.48	.....	4.70	.....
Other merchandise,.....	177,172	.....	.....	.....	3.00	2,232,348	3.00	2,232,348
Total merchandise,.....	458,327	\$719,870	\$1,594,512	253	.....	\$2,975,657	.....	\$3,345,236
OTHER ARTICLES.								
Live cattle, hogs and sheep,.....	255	\$150	\$332	147	2.00	\$750	2.68	\$1,005
Stone, lime and clay,.....	202,176	27,139	60,113	67	1.79	242,894	2.40	325,668
Gypsum,.....	59,163	9,837	21,789	83	1.79	88,041	2.40	118,044
Mineral coal,.....	225,507	26,258	58,161	116	1.79	470,018	2.40	630,192
Copper ore,.....	945	484	1,072	511	2.46	11,906	2.68	12,971
Sandites,.....	99,004	82,492	182,720	104	2.50	257,783	2.70	278,411
Total other articles,.....	587,041	\$146,380	\$324,187	.....	.....	\$1,071,397	.....	\$1,366,291
Total,.....	4,247,853	\$2,955,939	\$6,547,407	.....	.....	\$13,936,275	.....	\$16,609,558

TABLE U.

Statement of the business done on the Erie canal for the years 1851-2 and '53, by one of the largest forwarding houses, showing the tonnage, receipts for freight, mileage of the boats, and the expenses of doing the business.

SEASON.	Tons up.	Tons down.	Up freight.	Down freight.	Way freight.	Passage.	Total receipts.
1851—April and May,.....	1,412	4,230	\$8,706 41	\$18,698 23	\$453 51	\$491 64	\$28,349 79
June,.....	883	3,982	6,098 80	15,096 61	486 58	699 84	21,375 83
July,.....	624	3,794	3,683 14	15,943 91	443 42	569 43	20,638 39
August,.....	905	3,533	5,641 25	13,521 05	486 70	518 86	20,168 21
September,.....	1,461	3,295	8,326 16	12,255 40	255 29	339 95	21,176 79
October,.....	1,739	3,590	10,643 24	15,932 95	232 85	278 09	27,078 13
November and December,.....	2,133	3,156	11,301 57	16,656 12	375 58	192 55	28,525 82
	9,187	25,590	\$53,400 56	\$108,104 62	\$2,717 93	\$3,090 35	\$167,313 46
1852—April and May,.....	1,330	3,926	\$6,900 48	\$15,586 40	288 03	\$261 06	\$23,035 97
June,.....	2,352	4,247	9,031 60	17,527 16	203 25	277 19	27,029 20
July,.....	2,488	4,271	8,115 71	19,977 81	98 06	268 99	28,461 18
August,.....	2,268	3,860	8,083 34	16,459 13	135 04	98 98	24,776 49
September,.....	2,584	4,136	11,077 65	19,584 62	135 42	203 32	30,991 01
October,.....	2,361	3,638	10,284 73	17,420 88	148 24	109 25	27,963 10
November and December,.....	3,020	4,152	14,076 74	25,593 16	155 05	48 79	39,873 74
	16,313	28,030	\$67,560 25	\$132,149 16	\$1,153 70	\$1,267 58	\$202,130 69
1853—April and May,.....	1,265	3,680	\$5,848 66	\$15,376 95	\$79 01	\$47 41	\$21,350 03
June,.....	2,136	3,190	9,013 89	13,722 78	18 04	24 23	22,778 99
July,.....	2,485	3,513	8,434 46	14,946 72	45 93	47 75	23,474 86
August,.....	2,563	3,668	9,096 98	14,043 93	51 46	28 29	23,220 66
September,.....	1,878	2,896	7,649 43	13,982 26	21 67	27 91	21,680 87
October,.....	2,461	4,039	12,169 96	23,899 02	29 58	14 52	41,113 08
November and December,.....	2,557	4,824	17,369 54	29,409 91	45 47	.....	46,824 92
	15,325	25,810	\$69,580 92	\$130,381 57	\$291 16	\$190 16	\$200,443 41

TABLE U—(CONTINUED.)

SEASON.	Tolls up.	Tolls down.	Miles.	Towing.	Wages.	Extra labor.	Feed bills.	Total expenses
1851—April and May,	\$6,251 86	\$8,848 44	35,312	\$4,414 01	\$4,402 98	\$11 58	\$58 09	\$23,986 96
June,	3,955 08	7,950 31	37,856	4,732 00	4,183 38	28 00	53 67	20,902 44
July,	2,876 32	7,399 74	35,292	4,411 50	3,481 40	50 50	57 21	18,256 67
August,	4,480 20	6,715 32	33,483	4,186 00	3,419 91	78 00	44 90	18,924 33
September,	6,151 57	5,901 38	31,304	3,913 00	3,669 69	.....	47 68	19,683 30
October,	7,277 17	7,285 83	34,216	4,277 00	4,260 24	.....	59 90	23,140 14
November and December,	6,849 61	6,339 67	36,343	4,542 88	4,542 06	68 92	75 30	22,418 44
	\$37,841 81	\$50,420 69	243,811	\$30,476 39	\$27,939 66	\$237 00	\$396 73	\$147,312 28
1852—April and May,	\$4,018 77	\$7,494 40	29,448	\$3,431 04	\$3,759 67	\$295 25	\$45 15	\$19,044 25
June,	5,158 06	7,971 53	40,037	5,012 12	4,562 10	352 70	45 98	23,102 49
July,	4,699 45	9,198 52	39,676	4,959 50	4,572 09	246 49	58 32	23,734 35
August,	4,723 29	7,645 55	36,764	4,595 50	4,196 00	236 00	53 94	21,450 28
September,	7,090 61	8,720 60	38,584	4,823 00	4,645 35	311 50	71 33	25,662 39
October,	6,081 64	7,364 08	33,298	4,162 25	4,450 99	219 00	143 72	22,421 68
November and December,	7,914 17	9,053 22	44,186	5,523 25	5,849 13	65 75	236 04	28,671 56
	\$39,685 97	\$57,477 90	260,053	\$32,506 63	\$32,035 33	\$1,726 69	\$854 48	\$164,087 00
1853—April and May,	\$3,599 03	\$6,947 27	25,118	\$3,767 70	\$4,348 00	\$118 00	.....	\$18,780 00
June,	5,028 25	6,434 88	29,120	4,368 60	4,595 50	78 00	.....	20,494 63
July,	4,441 41	6,250 38	32,760	4,914 00	4,494 00	42 60	\$1 90	20,124 29
August,	4,915 85	6,306 49	34,944	5,241 60	5,061 00	100 00	.....	21,624 94
September,	4,733 63	6,164 86	27,300	4,095 00	4,331 50	144 20	.....	19,469 19
October,	7,614 71	7,921 37	36,400	5,460 00	6,745 50	297 22	.....	28,038 80
November and December,	9,237 04	10,067 50	49,611	7,441 65	7,494 88	283 25	.....	34,524 32
	\$39,569 92	\$50,062 75	235,253	\$35,287 95	\$37,070 38	\$1,063 27	\$1 90	\$163,056 17

From the foregoing table, it appears that the total charges for transportation in 1851, were 1,807 times the toll.
do do 1852, 2,050 do
do do 1853, 2,212 do

TABLE W.

The charges for transportation between the sea board and the west, by the various railroads and water lines.

	Per ton (of 2,000 lbs.) per mile.	
	Cents.	Mills.
<i>From New-York:</i>		
Hudson river, .....	..	7
Erie canal,	1	1
Western lakes, short voyage,	1	..
do long voyage, .....	..	5
New-York and Erie railroad,	2	4
Hudson River railroad,	3	1
New-York Central railroad,	3	4
Western roads, from Buffalo to Chicago, average, ..	2	5
<i>From Boston to western lakes:</i>		
New England roads from Boston to Rouse's Point, ..	2	7
Northern road, Rouse's Point to Ogdensburgh,	2	..
Lake Ontario and Welland canal, .....	..	7
Western road, Boston to Albany,	2	3
<i>From Quebec:</i>		
St. Lawrence river and canals, .....	..	6
<i>From Philadelphia:</i>		
Pennsylvania canal to Pittsburgh,	2	4
do railroad do (estimated,)	3	5
Ohio river, .....	..	8
<i>From Baltimore:</i>		
Baltimore and Ohio railroad,	3	..
<i>From New-Orleans:</i>		
Mississippi river, (lower) .....	..	6
do (upper) .....	..	9
Ohio canals,	1	..
Wabash and Erie Canal,	1	9
Illinois canal,	1	4
do river,	1	2

